

**IN THE UNITED STATES DISTRICT COURT  
FOR THE EASTERN DISTRICT OF NORTH CAROLINA  
WESTERN DIVISION**

GRAHAM YATES and	)	EDNC File No.5:12-cv-00752-FL
BECKY YATES, spouse,	)	
	)	
Plaintiffs,	)	
	)	
v.	)	
	)	
FORD MOTOR COMPANY, et al.,	)	
	)	
	)	
Defendants.	)	

**PLAINTIFFS' CONSOLIDATED MEMORANDUM OF LAW IN OPPOSITION TO  
DEFENDANTS' MOTIONS TO EXCLUDE DR. EUGENE MARK AND DR. ARNOLD BRODY**

Plaintiffs oppose the *Daubert* motions filed by Defendant Honeywell International Inc. ("Honeywell") (Doc. 380) and Defendant Ford Motor Company ("Ford") (Doc. 382), and would respectfully show the Court that these motions are without merit and should be denied.

**I. INTRODUCTION**

Defendants ask this Court to preclude testimony from Plaintiffs' causation experts, pathologist Dr. Eugene Mark and cellular biologist Dr. Arnold Brody, that exposure to asbestos brakes causes pleural mesothelioma and that "every exposure" to asbestos causes mesothelioma.<sup>1</sup> First, contrary to Defendants' mischaracterization, Dr. Mark and Dr. Brody do not hold the opinion that "every exposure" to asbestos causes mesothelioma. They will instead testify that mesothelioma is caused by a person's cumulative asbestos exposure and that exposures that contribute to the cumulative dose by meeting certain well-defined criteria can be considered a substantial factor in causing the mesothelioma. These opinions are based on scientific facts about asbestos and the causation of mesothelioma that are the consensus view among reputable scientists and that are undisputed outside the context of litigation.

---

<sup>1</sup> Dr. Brody will only testify about general causation. *See, e.g., Larson v. Bondex Int'l*, No. 09-69123, 2010 WL 4676563, at \*4 (E.D. Penn. Nov. 15, 2010) (noting that the purpose of Dr. Brody's testimony is "to assist the jury in understanding the relationship between exposure to asbestos fibers and disease processes generally").

In fact, the same opinions expressed by Dr. Mark and Dr. Brody have been expressed not only by Defendants' own expert in this case, Dr. Victor Roggli, but by Ford and Honeywell in documents generated outside the context of litigation, for the purpose of protecting their employees from asbestos disease like mesothelioma. Honeywell and Ford, when attempting to save employee lives rather than merely indemnity dollars, do not dare provide the kind of misinformation about asbestos and disease contained in their collective *Daubert* motions. The testimony of Ford and Honeywell, along with their corporate documents, lay bare their "do as we say, not as we do" litigation world versus real world duplicity. Ford and Honeywell, along with Honeywell's testifying expert in this case, Dr. Victor Roggli, all agree with the consensus view that low levels of asbestos exposure cause mesothelioma, irrespective of which type of asbestos is the source of exposure. As will be set forth in these materials, and as Ford and Honeywell have repeatedly admitted outside of litigation, asbestos brake linings were neither uniquely safe nor otherwise magic in the spectrum of asbestos products. Rather, asbestos brake linings, compared to many other asbestos products, contained more asbestos, and were especially dusty, leading to respirable exposures to asbestos substantially above that which may be present in ambient air, when grinded, sanded, abraded, beveled, swept, or blown out of a brake drum with an air compressor.

Defendants' attack on generally accepted scientific facts are purely the result of a carefully calculated litigation strategy, and do not have a basis in legitimate science. The evidence shows that Defendants' false assertion that asbestos brakes have not been linked to mesothelioma is a coordinated litigation defense strategy between Ford, its lawyers, and scientific consulting firms willing to accept millions of dollars to write industry-friendly articles about asbestos brakes. Defendants' generated this science for the very purpose of bringing motions like the instant motions that attempt to cast doubt on scientific principles that have been accepted in the mainstream scientific community for many years. Reputable scientists have rejected this effort and do not agree with the assertions made by Defendants' paid consultants and experts.

The foundation for Dr. Mark's and Dr. Brody's causation opinions is set forth at length herein, but statements by defense expert Dr. Roggli, as well as Ford and Honeywell, establish that their opinions are reliable and represent the consensus views about the causation of asbestos-related disease. Numerous state and federal courts have admitted the causation testimony of Dr. Mark and Dr. Brody as reliable and helpful to the trier of fact. For these reasons, fully supported and set forth below, Defendants' motion should therefore be denied.<sup>2</sup>

## **II. LEGAL STANDARDS FOR THE ADMISSIBILITY OF EXPERT TESTIMONY.**

The prerequisites for an expert witness to give opinion testimony are that "(1) the testimony is based upon sufficient facts or data, (2) the testimony is the product of reliable principles and methods, and (3) the witness has applied the principles and methods reliably to the facts of the case." FED. R. EVID. 702. In *Daubert v. Merrell Dow Pharmaceuticals Inc.*, 509 U.S. 579 (1993), the U.S. Supreme Court held that expert testimony need be based only on a reliable and scientifically valid methodology that fits with the facts of a case. See *Heller v. Shaw Indus., Inc.*, 167 F.3d 146, 152 (3d Cir. 1999) (citing *Daubert*, 509 U.S. at 592-93). The Supreme Court "listed four factors to guide a district court in its preliminary assessment of these requirements,"<sup>3</sup> but cautioned that these were guideposts and not required factors in each case." *Id.* Rather, "these factors should not obscure the fact that the district court's gatekeeper role is a flexible one, and that the factors are simply useful signposts, not dispositive hurdles that a party must overcome in order to have expert testimony admitted." *Id.* (citing *Daubert*, 509 U.S. at 593-94 & n.12).

---

<sup>2</sup> For purposes of conservation, Plaintiffs incorporate by reference all 81 exhibits already filed in support of Plaintiff's opposition to Honeywell's previously filed *Daubert* motion against Dr. Mark. Those exhibits bear the following Docket numbers: 332-1 to 332-20; 333-1 to 333-10; 334-1 to 334-10; 335-1 to 335-10; 336-1 to 336-10; 337-1 to 337-10; and 338-1 to 338-11. Those exhibits are not being re-filed, but the citations herein to Exhibits 1 through 81 are referencing those previously filed exhibits. Additional exhibits, marked 82 through 108, are being filed with this Consolidated Memorandum in Opposition.

<sup>3</sup> The *Daubert* factors include: (1) whether an expert's theory can be tested; (2) whether the theory or technique has been subjected to peer review or publication; (3) whether there is a known potential rate of error; and (4) whether there is widespread acceptance of the theory or technique in the relevant scientific community. *Daubert*, 509 U.S. at 593-94. *Kumho*, like Section 2702 of the Oklahoma Evidence Code, does not appear to draw a distinction between "scientific" evidence and "technical" or "other specialized" knowledge. *Christian*, 65 P.3d at 599.

Importantly, the trial court's gatekeeper role is not intended to replace the adversary system. *See Maiz v. Virani*, 253 F.3d 641, 666 (11th Cir. 2001). Rather, as the Court specifically recognized in *Daubert*, "cross-examination, presentation of contrary evidence, and careful instruction on the burden of proof" are the ordinary means to attack an opposing expert. *Daubert*, 509 U.S. at 596.

Trial courts may not exercise their gatekeeping responsibility by excluding expert testimony that falls within the range of matters on which reasonable experts can disagree. *See Milward v. Acuity Specialty Prods. Group, Inc.*, 639 F.3d 11, 22 (1<sup>st</sup> Cir. 2011). Trial courts are not "empowered 'to determine which of several competing scientific theories has the best provenance.'" *Id.* at 15 (quoting *Ruiz-Troche v. Pepsi Cola of P.R. Bottling Co.*, 161 F.3d 77, 85 (1<sup>st</sup> Cir. 1998)). While the trial court may look at the reliability of the expert's methodology, it is for the jury to determine the soundness of the facts underlying the expert's opinion and the correctness of his or her conclusions. *See id.* 22. The entire body of evidence relied on by the expert should be taken into consideration in evaluating the reliability of the opinion, and the court should refrain from an "atomistic" approach that determines that each piece of evidence is insufficient, on its own, to support the expert's conclusion. *Id.* The mere fact that an expert's methodology requires the application of scientific judgment does not render it unreliable. *See id.* at 18.

### **III. PLAINTIFFS' EXPERTS DO NOT OPINE THAT "EACH AND EVERY EXPOSURE" TO ASBESTOS CAUSES DISEASE.**

#### **A. Dr. Eugene Mark.**

Dr. Mark is an extremely well qualified pathologist whose expertise in asbestos-related disease has been recognized by courts across the country. He received his medical degree from Harvard Medical School in 1967. **Ex. 7**, Expert Report and Declaration of Eugene Mark, M.D., August 2013, at 2-3; **Ex. 8**, Curriculum Vitae. He is board certified by the American Board of Pathology in Pathologic Anatomy, Clinical Pathology and Dermatopathology. He is a pathologist at Massachusetts General Hospital, as well as a full Professor of Pathology at Massachusetts General Hospital, Harvard Medical School, where he has taught since 1974. He has published almost 300 articles in the peer-reviewed literature, many on asbestos-related diseases. *See, e.g., Exs. 78-80.*

Dr. Mark's opinions in this case are contained in his Report dated June 17, 2013, (**Ex. 9**), his Report and Declaration dated August 1, 2013 (**Ex. 7**), his deposition taken on March 16, 2015 (**Ex. 10**), his deposition taken on April 6, 2015 (Doc. 381-1), his deposition taken on April 27, 2015 (Doc. 381-2), his deposition taken on April 28, 2015 (Doc. 381-3), and on his Declaration dated May 18, 2015. **Ex. 82**, Mark Decl., 5/18/15. Dr. Mark had to complete his opinions in a declaration after his deposition because Defendants' examination occupied the entire additional eight hours the Court allowed for his deposition and Plaintiffs' counsel had no opportunity to conduct a re-direct examination. Mark Decl., at 1.

In reaching his opinions about the causative role of Graham Yates's exposure to asbestos brake friction products, Dr. Mark relied on a multiple-step scientific methodology, including substantial epidemiology and other scientific literature establishing that asbestos exposure causes disease, as well as case-specific data regarding the details of Yates's exposure to asbestos from his work with and around asbestos brakes. Dr. Mark's report explains that he utilizes the scientific method to determine the question of general causation, including the nine Bradford-Hill criteria for establishing causation of disease. Mark Report and Declaration, August 2013, at 9-10. He takes a multi-disciplinary approach that considers the entirety of the scientific literature, including, among other things, epidemiology, industrial hygiene, experimental issues, biology, molecular medicine, and movement of fibers. Mark Depo., 3/16/15, at 55:21-56:16, 69:20-70:2.

Dr. Mark is of the opinion that mesothelioma is caused by a person's cumulative asbestos exposure. Mark Report, June 2013, at 3; Mark Report, August 2013, at 2, 11-12, 28. "The total and cumulative exposure to asbestos from all the special exposures prior to the occurrence of a diffuse malignant mesothelioma causes the diffuse malignant mesothelioma, and each of the special exposures contributes to its pathogenesis." Mark Report, June 2013, at 3. A "special exposure" is shorthand for those types of exposures that the scientific literature has shown create a risk of developing diffuse malignant mesothelioma. *Id.*; Mark Depo. 3/16/15, at 48:8-12. In other words, there must be "scientific evidence" to include that an exposure increases the risk of disease before the exposure can be considered a substantial factor in causing the disease. Mark Depo., 3/16/15, at 48:13-20, 74:20-75:5. In determining

whether an exposure was a substantial factor in causing the plaintiff's disease, Dr. Mark testified that he considers many factors: "I would take in to account many issues including the type of work, how the work was done, the duration, intensity, and proximity . . . [and] the different fiber types . . . ." Mark Depo., 3/16/15, at 76:11-15.

Dr. Mark reviewed and relied on Yates's testimony about exposure to visible dust when changing brakes on his own cars, working at an Esso gas station in the 1950s, and working as a parts handler at a Ford dealership in the 1960s. Mark Report and Declaration, August 2013, at 4-5. In his deposition, he described that Yates was exposed to asbestos brakes over a period of years. Mark Depo., 3/16/15, at 81:23-82:19. Dr. Mark noted a number of studies showing that the activities described by Yates—including cleaning brake drums, sanding new brake pads, handling brake boxes, and sweeping up after brake changes—resulted in substantial exposures to asbestos. Mark Report and Declaration, August 2013, at 5-7.<sup>4</sup> He concluded that, "[b]ased on my review of this literature, and the work practices described by Mr. Graham Yates, it is my opinion that the work with asbestos brakes performed by Mr. Graham Yates and others in his presence caused him to be exposed to asbestos substantially above background levels, as defined by both Nicholson and the Environmental Protection Agency." *Id.* at 7. He lists numerous scientific articles that support his opinion that Yates's brake exposures were a substantial contributing factor in the development of his mesothelioma. *Id.* at 7-9.

Dr. Mark's report also discusses the substantial body of literature finding that mesothelioma is caused by brief and low level exposures to asbestos. *Id.* at 17-23. Dr. Mark compared Yates's exposure history to the scientific literature and stated his conclusion that Yates "was exposed to a range of exposures that have been shown in the literature cited herein to cause diffuse malignant mesothelioma." *Id.* at 28. Dr. Mark is of the opinion that Yates's exposures to Bendix and Ford brake friction products were substantial contributing factors in causing Yates's mesothelioma. *Id.* at 7, 29.

Contrary to Defendants' contention, Dr. Mark does not opine in this case that "every exposure to asbestos" causes disease. (Doc. 381 at 1). Dr. Mark testified that he would not simply attribute

---

<sup>4</sup> Dr. Mark also relied on the expert report of Plaintiff's expert in industrial hygiene, Steve Hays. **Ex. 39.**

mesothelioma to asbestos exposure simply based on the fact of diagnosis. Mark Depo., 3/16/15, at 25:13-17. He further explained that he does not believe that the mere presence of asbestos fibers in the lungs would be sufficient to indicate an increased risk of developing mesothelioma. *Id.* at 79:15-21. He does not believe that trivial exposures are causative, and explained that a trivial exposure would be one where there was no scientific evidence to conclude that there is an increased risk of disease. *Id.* at 49:14-25.

When asked whether his reference to cumulative asbestos exposure refers to “each and every exposure” that an individual experiences, Dr. Mark answered, “No.” (Doc. 381-1 at 17:20-23; *see also* Doc. 381-3 at 294:17-21). When asked again about whether he believes “every exposure” to asbestos that Yates had contributed to cause his disease, Dr. Mark explained that, “[e]very special exposure encountered—with encountering occupational or para-occupational exposures did increase his risk of developing disease, but I’m not able to talk about individual fibers.” (Doc. 381-3 at 331:4-12). As he recently testified in another case, “I do not think that one individual fiber can cause disease.” **Ex. 11**, Deposition of Dr. Eugene Mark, *Cowan v. Agco Corp., et al.*, 8/7/13, at 67:16-22. He further elaborated that it would not be a special exposure to be exposed to an asbestos product on only one occasion because “there is no scientific reason or evidence to show you that that type of single exposure causes increased risk of disease.” *Id.* at 68:12-69:9.

#### **B. Dr. Arnold Brody**

Dr. Brody is a cell biologist who testifies about the biological mechanisms of how asbestos exposure causes mesothelioma. **Ex. 83**, Brody Depo., 11/13/14, *Bodine v. 3M Company*, at 16:13-15; **Ex. 84**, Expert Report of Arnold R. Brody, Ph.D., 6/13/13. He has not reviewed any case-specific materials and will not offer any case-specific testimony, except that he may be asked to answer a hypothetical question that assumes some of the facts in this case. But, as Defendants are aware, the purpose of Dr. Brody’s testimony is to educate the jury about the manner in which asbestos causes disease on cellular and genetic levels and which types of asbestos can cause the cellular and genetic changes that can lead to disease. Dr. Brody, like Dr. Mark is an expert on asbestos disease *outside* the Courtroom, too. His more than 100 peer-reviewed published studies on asbestos and disease were sponsored for by the National

Institute of Health. His credentials as a genuine asbestos disease expert stand in stark contrast to Honeywell's testifying witness, Dr. Garabrant, whose "meta-analysis" paper (no original research was done) was specifically requested and paid for by *Ford's* attorneys in 2003 as a litigation product at a price of over \$105,000. For a number of years, Dr. Brody has testified in courtrooms throughout the United States about the mechanical pathways that lead to the causation of asbestos-related diseases. His testimony has not changed over the years. Brody Depo. at 53:25-54:2. An example of his trial testimony is set forth in **Ex. 85**, Trial Testimony, Sept. 19-20, 2013, *Leaman v. John Crane, Inc.*, Philadelphia Court of Common Pleas. His testimony is routinely accepted and is rarely challenged. He is one of the most universally respected and well-known expert witnesses by either the Plaintiff or defense bars.

Dr. Brody does not opine that all exposures to asbestos cause mesothelioma. He was not even asked that question at his deposition in this case. He has recently addressed this issue in deposition testimony in a case before the district court for the District of Minnesota, and explained that, "if you have a level of asbestos exposure above background for, you know, weeks, months, whatever, it could be a brief exposure, that my opinion is enough to cause genetic errors and start a disease process." Brody Depo. at 29:7-12. Dr. Brody believes that every exposure above background is part of the cumulative exposure that causes the disease, but he does not believe that isolated or minimal exposures contribute. He explained that, "multiple days in a setting where we know that there are exposures above background, that would contribute. So the walk-through, I wouldn't say contributes and it never has." Brody Depo at 35:6-10. His reference to a "walk-through" was in response to a question about whether merely walking through an automotive garage would be a causative exposure, and Dr. Brody testified that it would not be:

Q. So if the person who has the eight weeks of exposure 30 years later develops mesothelioma, and prior to that eight weeks of exposure walks through a garage where there is brake work going on or friction work going on, I think you would tell me that contributed to his mesothelioma?

A. I think you're putting words in my mouth. I wouldn't say that walking through a passive brake job contributes. I would never say that.

**My testimony is that you have to be exposed days, weeks, typically months or more for that to be a contributing factor.** So walking through doesn't mean anything to me.



Brody Depo. at 33:19-34:10 (emphasis added).

**IV. PLAINTIFFS' EXPERTS' OPINIONS ARE BASED ON RELIABLE SCIENCE AND REPRESENT THE CONSENSUS OF THE SCIENTIFIC COMMUNITY.<sup>5</sup>**

**A. There is a consensus among scientists that there is no known "safe" level of exposure to asbestos and that low cumulative exposures to asbestos cause mesothelioma.**

Dr. Mark's and Dr. Brody's opinions regarding the cumulative nature of asbestos diseases and the significance of each exposure to asbestos that meets certain criteria are not "unreliable," but are well-grounded in an abundance of medical and scientific evidence and are accepted as the consensus causation opinion by the vast majority of the medical and scientific communities, including government agencies and independent experts from numerous national and international institutions.

Defendants' own expert, Dr. Victor Roggli is entirely in agreement on all the major scientific principles underlying Dr. Mark's causation opinions in this case. Dr. Roggli has testified in relevant part that:

- **"Science has not demonstrated any cause of mesothelioma in the workplace other than exposure to all forms of asbestos dust, which makes it a signal malignancy, i.e., an epidemiological marker for exposure to asbestos."**
- **"Because asbestos dust is so strongly associated with mesothelioma, proof of significant exposure to asbestos dust is proof of specific causation."**
- **"The scientific and medical community has yet to determine a level of exposure to asbestos below which mesothelioma will not occur."**
- **"Very low levels of exposure above background, however, have been demonstrated to cause mesothelioma."**
- **"It is also my opinion that it is the total dose of asbestos, regardless of fiber type, that the patient experiences that causes the disease."**
- **"It is further my opinion that each and every exposure to asbestos that an individual with mesothelioma experienced in excess of background level is a substantial contributing factor in the development of the disease."**

**Ex. 1, Roggli Affidavit, 5/29/01, at 2-3 (emphasis added).**

---

<sup>5</sup> This Memorandum in Oppositino discusses voluminous scientific literature supporting Dr. Mark's and Dr. Brody's opinions. For the sake of economy and efficiency, Plaintiffs have only filed the key articles as exhibits. Plaintiffs will promptly provide additional cited articles to the Court upon request.

Dr. Roggli has reiterated these opinions multiple times. He signed an affidavit in 2005 that contains all of these same opinions. **Ex. 2**, Roggli Affidavit, 5/20/05, at 2. In 2007, Dr. Roggli again agreed that there is no identified threshold of asbestos exposure below which mesothelioma will not occur in humans. **Ex. 3**, Deposition of Victor Roggli, M.D., *Pounds v. Alfa Laval, Inc., et al.*, 5/8/07, at 46:18-47:7. at 59:2-8. He agreed that mesothelioma is a cumulative disease and that each exposure above background contributes to the total dose, increases the risk of disease, and shortens the latency time period in which the disease develops. *Id.* at 62:2-8, 62:17-63:16.

Only two months ago, Dr. Roggli was still testifying that all forms of asbestos cause mesothelioma:

Q. And, Dr. Roggli, do you agree with the following:

The causal relationship between asbestos exposure to all forms of asbestos dust and the development of mesothelioma is so firmly established in the medical and scientific literature that it is accepted as scientific fact.

In this respect, it's like the relationship between smoking and lung cancer, HIV and aids, or even water in the lungs and drowning?

THE WITNESS: Yes.

**Ex. 4**, Deposition of Victor Roggli, M.D., *Winkel v. Calaveras Asbestos, Ltd., et al.*, 3/10/15, at 91:12-24 (objection omitted). Dr. Roggli again expressed his opinion that the scientific community has never identified a safe level of asbestos exposure. *Id.* at 53:13-17. In his own medical practice, Dr. Roggli has seen cases of mesothelioma caused by as little as one month of total asbestos exposure. *Id.* at 53:18-21. He believes that all exposures to asbestos that accumulate in the lung above background levels contribute to cause mesothelioma. *Id.* at 53:22-54:14. Dr. Roggli has also found in his own research that each exposure above background shortens the latency period, and agrees that if a person is spared an exposure above background their disease will take longer to develop. *Id.* at 54:15-55:21. He further agrees that it has been known in the medical literature since 1930 that reducing asbestos exposures will delay the onset of the disease. *Id.* at 55:22-56:1; *see also* **Exs. 67, 68, and 81**.

These opinions are consistent with those set forth by the world's foremost experts in asbestos-related disease. A consensus opinion about the causation and attribution of asbestos-related diseases,

including mesothelioma, was reached in 1997 by a group of 19 experts from 8 different countries who met in Helsinki, Finland “to discuss disorders of the lung and pleura in association with asbestos and to agree upon state-of-the-art criteria for their diagnosis and attribution with respect to asbestos.” **Ex. 17**, *Consensus Report: Asbestos, asbestosis, and cancer: the Helsinki criteria for diagnosis and attribution*, SCAND J WORK ENVIRON HEALTH, 23:311-6, 311 (1997) (“Consensus Report”). Dr. Roggli was among the scientists who authored the Consensus Report. Dr. Roggli and other scientists determined that, given the undeniable link between exposure to asbestos and mesothelioma, it is universally accepted that “a history of significant occupational, domestic, or environmental exposure to asbestos will suffice for attribution.” *Id.* at 313. The Consensus Panel also considered the following generally accepted concepts regarding mesothelioma:

- The great majority of mesotheliomas are due to asbestos exposure.
- Mesothelioma can occur in cases with low asbestos exposure . . . .
- An occupational history of brief or low-level exposure should be considered sufficient for mesothelioma to be designated as occupationally related.
- A minimum of 10 years from the first exposure is required to attribute the mesothelioma to asbestos exposure, though in most cases the latency interval is longer (e.g., on the order of 30 to 40 years).

*Id.* at 313. These conclusions were reaffirmed by these same international experts as recently as last year.

**Ex. 86**, *Consensus Report: Asbestos, asbestosis, and cancer: the Helsinki criteria for diagnosis and attribution 2014*, Scand J Work Environ Health, 41(1):5-15 (2014) (“Consensus Report 2014”).

The Helsinki group, including Dr. Roggli, reconvened in 2014. They reached exactly the same conclusions as they had in 1997, as stated above, including but not limited to, “[a]n occupational history of brief or low-level exposure should be considered sufficient for mesothelioma to be designated as occupationally related.” Consensus Report 2014, at 6. If Dr. Roggli thought that a special exception exists or should exist for exposures to asbestos-containing friction products like brake linings, that opinion did not reach enough consensus to get published. The consensus remains: exposure to asbestos products (event to friction products), at even brief or low-levels, “should be considered sufficient” for

mesothelioma to be designated as occupationally related. Dr. Mark and Dr. Brody rely on the Helsinki Criteria, and it is the best expression of actual mainstream consensus about when or how a mesothelioma should be attributed to previous asbestos exposure. The causation opinions of Drs. Mark and Brody are in the genuine medical and scientific mainstream while Ford and Honeywell continue to promote litigation rhetoric from outside it.

Dr. Mark's opinion that exposures meeting certain criteria contribute to the aggregate dose that ultimately caused Graham Yates's mesothelioma is premised on many of these findings from the Consensus Report. As succinctly stated by the U.S. Environmental Protection Agency ("EPA"): "Because asbestos fibers remain in the body, each exposure increases the likelihood of developing an asbestos-related disease." **Ex. 40**, *Guide for Ship Scrappers: Tips for Regulatory Compliance*, p. 2-6 (Summer 2000).

In 2014, the Occupation Safety and Health Commission reiterated the same facts of medical causation: "Workers are also likely to be exposed during the manufacture of asbestos products (such as textiles, friction products, insulation, and other building materials) during automotive and clutch repair work . . . . Asbestos exposures as short as in duration as a few days have caused mesothelioma in humans. Every occupational exposure to asbestos can cause injury of disease; every occupational exposure to asbestos contributes to the risk of getting an asbestos-related disease." **Ex. 106**, OSHA Website, Safety and Health Topics: Asbestos, <https://www.osha.gov/SLTC/asbestos>, last visited 1/8/14. Try as they might to *change* mainstream conclusions of asbestos disease health experts, like those of the medical professionals the United States government charged with protecting the occupational health of American workers, Ford and Honeywell have failed to persuade.

It has been long recognized that there is no known level of asbestos exposure below which mesothelioma does not occur. In 1938, it was proposed that there be an occupational limit on exposure to

dust containing asbestos fibers<sup>6</sup> of 5 million particles per cubic foot (“mppcf”) to reduce the incidence of pulmonary asbestosis, a non-malignant scarring of the lungs. See Schall, *Present Threshold Limit Value in the U.S.A. For Asbestos Dust: A Critique*, Occupational Health Program, New Jersey State Department of Health, ANN NY ACAD SCI, 132(1): 316-321, 316-317 (1965). Even though the American Conference of Governmental Industrial Hygienists (“ACGIH”) adopted this level of 5 mppcf as a threshold limit value (“TLV”) in 1946 and it remained so until at least 1968, the asbestos industry knew that it was not a “safe” level of exposure that would prevent asbestosis. See *Biological Effects of Asbestos, Discussion*, ANN NY ACAD SCI, 132(1):335-337, 335-36 (1965). More importantly, the ACGIH’s 5 mppcf TLV was never intended to state a safe level for any asbestos-induced malignancies, such as mesothelioma.

Numerous federal and international agencies have concluded that there is no known safe level of asbestos exposure. These include the World Health Organization (“WHO”), the International Agency for Research on Cancer (“IARC”), the EPA, The National Cancer Institute (“NCI”), the National Institutes of Occupational Safety and Health (“NIOSH”), and the Consumer Products Safety Commission (“CPSC”).

Groups of researchers continued to conclude that there is no threshold below which there is no risk from exposure to asbestos. **Ex. 18**, Landrigan et al., *The Hazards of Chrysotile Asbestos: A Critical Review*, IND HEALTH 37:271-280, 275 (1999); **Ex. 41**, Hillerdal, *Mesothelioma: Cases Associated with Non-Occupational and Low Dose Exposures*, OCCUP ENVIRON MED 56:505-513, 510 (1999).

“Low level” and “short-term” asbestos exposures have been repeatedly shown to cause mesothelioma in the peer-reviewed scientific literature. See, e.g., **Ex. 42**, Offermans et al., *Occupational Asbestos Exposure and Risk of Pleural Mesothelioma, Lung Cancer, and Laryngeal Cancer in the Prospective Netherlands Cohort Study*, J Occup Envir Med 56(1) (Jan. 2014); **Ex. 64**, Skamneritz et al., *Asbestos Exposure and Survival in Malignant Mesothelioma*, Intl J Occ Env Med 2(4):224-236 (Oct. 2011); Peto, *The Hygiene Standard for Chrysotile Asbestos*, THE LANCET 484-489, 485 (Mar. 4, 1978);

---

<sup>6</sup> Because of the difficulty in identifying and quantifying specific structures in air samples using the collection methods of the time, Dreessen's proposal counted *total dust particles* in the air sample, not just asbestos fibers.

Doll and Peto, EFFECTS ON HEALTH OF EXPOSURE TO ASBESTOS, 310, 320 (1985); Seidman, Selikoff, and Gelb, *Mortality Experience of Amosite Asbestos Factory Workers: Dose-Response Relationships 5 to 40 Years After Onset of Short-Term Work Exposure*, AM J IND MED 10:479-514, 480 (1986); Newhouse & Thompson, *Mesothelioma of Pleura and Peritoneum Following Exposure to Asbestos in the London Area*, BR J IND MED 22:261-66 (1965); Greenburg & Davies, *Mesothelioma Register 1967-68*, BR J IND MED 31:91-104 (1974).

In 2001, the Agency for Toxic Substances and Disease Registry (“ATSDR”) noted that the EPA “calculated that lifetime continuous exposure to asbestos air concentrations of 0.0001 fiber/mL could result in up to 2-4 cancer deaths (lung cancer or mesothelioma) per 100,000 people.” ATSDR, “Chemical-Specific Health Consultation: Tremolite Asbestos and Other Related Types of Asbestos,” at 3-4 (Sept. 2001). In other words, exposures as low as 0.0001 fiber/ml could cause excess mesothelioma deaths.

Asbestos-related mesothelioma, like other diseases caused by the inhalation of asbestos, is a dose response disease—meaning that increasing levels of exposure increase the risk of contracting the disease—even at low levels. The National Research Council calculated that a cumulative dose of 0.03 f/cc-years would result in 9 cases of mesothelioma per million person years. *See* National Research Council, Committee on Nonoccupational Health Risks of Asbestiform Fibers, *Asbestiform Fibers: Nonoccupational Health Risks*, National Academy Press 212 (1984). At a higher cumulative dose of 0.146 f/cc-years, there was a five-fold increased risk. *Id.*

In addition, a large case-control study conducted in France, the authors found that, “[a] significant excess of mesothelioma was observed for levels of cumulative exposure that were probably far below the limits adopted in many industrial countries during the 1980s.” **Ex. 19**, Iwatsubo, et al, *Pleural Mesothelioma: Dose-Response Relation at Low Levels of Asbestos Exposure in a French Population-based Case-Control Study*, AM J EPID 148(2):122-142 (1998). The findings of Iwatsubo were replicated by Dr. Rodelsperger and his colleagues, who observed a “distinct dose-response relationship even at levels of cumulative exposure below 1 fiber year.” **Ex. 20**, Rodelsperger et al., *Asbestos and Man-Made Vitreous Fibers as Risk Factors for Diffuse Malignant Mesothelioma: Results From a German Hospital-*

*Based Case-Control Study*, AM J INDUS MED 39: 262-275, 262 (2001); *see also* **Ex 53**, Rolland, *Risk of pleural mesothelioma: A French population-based case-control study (1998-2002)* (Oct. 20, 2006).

The importance of each significant exposure is highlighted by the inverse relationship between the amount of asbestos inhaled and the time period in which a mesothelioma will develop if it is going to develop. The lower the dose, the longer the latency period. *See e.g.*, **Ex. 46**, Bianchi, *Latency periods in asbestos-related mesothelioma of the pleura*, EUR J CANCER PREV 6:162-166 (1997); **Ex. 57**, Lin et al., *Ecological association between asbestos-related diseases and historical asbestos consumption: an international analysis*, Lancet 369:844-849 (2007); **Ex. 65**, Pan et al., *Residential Proximity to Naturally Occurring Asbestos and Mesothelioma Risk in California*, Am J Respir Crit Care Med 172:1019-1025 (2005).

Thus, as demonstrated by this abundant scientific literature, Dr. Mark's opinion that mesothelioma is caused by cumulative asbestos exposure and that all special exposures are substantial contributing factors in contributing to the total exposure and causing an individual's mesothelioma, is not his own unfounded theory but rather is a summation of medical facts found in the peer-reviewed and published literature. Recently, Dr. Laura Welch and 51 other scientists, researchers and medical professionals representing "hundreds of years of experience researching, diagnosing, and treating asbestos-related disease in workers and their families," published a paper outlining the consensus of the mainstream scientific community regarding the causation of asbestos-related disease. **Ex. 21**, Welch, *Asbestos Exposure Causes Mesothelioma, But Not **This** Asbestos Exposure: An Amicus Brief to the Michigan Supreme Court*, INT J OCCUP ENVIRON HEALTH 13:318-327 (2007). These fifty-two independent experts explained that, "[t]he mainstream scientific community has long recognized and continues to recognize today that there is no 'safe' level of exposure to asbestos." *Id.* at 319. The scientists concluded that, "the consensus of the scientific community is that any occupational or para-occupational exposure to asbestos - even 'brief or low-level exposures' - must be considered causal in an individual with a mesothelioma." *Id.* at 321 (emphasis added).

Further undermining Defendants' contention that Dr. Mark's opinions are not generally accepted in the scientific community is the fact that experts who frequently testify for both plaintiffs and defendants in the asbestos litigation share the same views. For example, Dr. Victor Roggli, Defendants' expert in this case, has written in the published, peer-reviewed literature that "[e]pidemiologic studies have shown that mesothelioma can develop years after brief or low level exposures." **Ex. 22**, Roggli, *Human Disease Consequences of Fiber Exposures: A Review of Human Lung Pathology and Fiber Burden Data*, ENV HEALTH PERSPECTIVES 88:295-303, 298 (1990). In addition, as discussed *supra*, Dr. Roggli has also expressed the opinion that there is no known level of exposure to asbestos below which mesothelioma will not occur, that it is the total dose of asbestos, regardless of fiber type, that the patient experiences that causes the disease, and that each and every exposure to asbestos above background levels is a substantial contributing factor in causing mesothelioma. Roggli Affidavit, 5/29/01, at 2. Defense expert Dr. Andrew Churg, a pathologist, has also testified "that a single exposure to asbestos can cause mesothelioma, with each subsequent exposure exponentially increasing the risk of disease." *Purcell v. Asbestos Corp. Ltd.*, 959 P.2d 89, 93 (1998), *modified on other grounds*, 963 P.2d 729 (1998).

**B. There is a scientific consensus that chrysotile asbestos causes mesothelioma.**

Defendants' suggestion that there is any doubt about the ability of chrysotile asbestos to cause mesothelioma is not based on sound science and should be rejected by this Court. There is no real dispute among scientists that chrysotile asbestos causes mesothelioma. Recently, a trial court judge in Iowa recognized that any supposed dispute is entirely a litigation strategy, not a genuine scientific debate:

Defendant contends there has been a "sharp debate" about whether chrysotile asbestos causes mesothelioma, and asserts that low dose chrysotile exposures do not cause mesothelioma. However, there is no evidence in this record that this was a "dispute" that was factored into or calculated into Weil-McClain's decision not to warn about the hazards of its asbestos products. **Rather---I agree here with Plaintiffs---this was a "dispute" created for the purpose of a defense in this litigation. For example, Weil-McClain's expert, Rasmuson, was unable to identify a single scientist outside the defendant-sponsored Exponent that agrees chrysotile does not cause mesothelioma.**

**Ex. 87**, *Kinseth v. A.Y. McDonald Industries*, at 20 (Iowa District Court for Wright County May 1, 2015) (emphasis added).



Indeed, outside the context of litigation, Honeywell and Ford, as well as their expert Dr. Victor Roggli, all *agree* with Dr. Mark and Dr. Brody that chrysotile asbestos causes mesothelioma. Dr. Roggli firmly believes that chrysotile can cause mesothelioma:

- **“The overwhelming world scientific consensus is that dust from all three commercial types of asbestos** incorporated in products manufactured in the United States, amosite and crocidolite from South Africa and **chrysotile from Canada, are all capable of causing mesothelioma.”**
- **“Indeed, the causal relationship between exposure to all forms of asbestos dust and the development of mesothelioma is so firmly established in the medical and scientific literature that it is accepted as scientific ‘fact.’”**

Roggli Affidavit, 5/29/01, at 2-3. In 2007, Dr. Roggli testified that it is the consensus opinion among experts in asbestos disease that chrysotile asbestos causes mesothelioma. Roggli Depo., 5/8/07, at 46:18-47:7. In March 2015, he agreed that the relationship between exposure to all forms of asbestos dust and mesothelioma is so firmly established in the medical and scientific literature that it is accepted as scientific fact. Roggli, Depo., 3/10/15, at 91:12-24.

The conclusions reached by Dr. Mark, Dr. Brody, and Dr. Roggli, are supported by an abundance of scientific literature. *See, e.g., Ex. 55*, Langer and Nolan, *Asbestos in the lungs of persons exposed in the USA*, *Monaldi Arch Chest Dis* 53(2):168-180 (Apr. 1998); *Pathology of Asbestos-associated Diseases* 108 (Roggli, et al., eds., 2nd ed. 2004) (“[I]t is clear that sufficient exposure to chrysotile may result in the development of mesothelioma . . . .”); Lemen, *Chrysotile Asbestos as a Cause of Mesothelioma: Application of the Hill Causation Model*, *Int’l J. Occup. Envtl. Health* 10:233-239 (2004) (There is “no doubt that the scientific evidence supports the carcinogenicity of chrysotile alone in the induction of mesothelioma.”); Harrington, *The Carcinogenicity of Chrysotile Asbestos*, in *The Third Wave of Asbestos Disease: Exposure to Asbestos in Place* (Landrigan & Kazemi, eds. 1991) 465, at 470 (“[C]hrysotile asbestos is carcinogenic in humans, especially for the induction of lung cancer and mesothelioma in exposed populations . . . .”; Li et al., *Cohort Studies on Cancer Mortality Among Workers Exposed Only to Chrysotile Asbestos: A Meta-Analysis*, *Biomedical & Envtl. Sci.* 17:459-68 (2004) (reporting, based on meta-analysis of multiple epidemiological studies, that exposure to chrysotile fibers alone increased risk

of mesothelioma); Pathology of Occupational Lung Disease 351 (Churg & Green eds., 2nd ed. 1998) (“These observations leave no doubt that enough exposure to chrysotile ore can produce mesothelioma in man.”); Selikoff & Lee, Asbestos and Disease 280 (1978); Landrigan, et al., *The Hazards of Chrysotile Asbestos: A Critical Review*, Indus. Health 37:271-280 (1999) (reviewing 40 studies of workers exposed to asbestos and concluding that “[c]linical and epidemiologic studies have established beyond all reasonable doubt that chrysotile asbestos causes cancer of the lung” and “malignant mesothelioma of the pleura and peritoneum . . .”).

In 1996, Drs. Smith and Wright concluded that “[c]hrysotile asbestos is a potent cause of pleural mesothelioma.” **Ex. 23**, Smith and Wright, *Chrysotile Asbestos Is the Main Cause of Pleural Mesothelioma*, AM J IND MED 30:252-266, 255 (1996). The authors found that exposure to chrysotile asbestos “even at the relatively low levels expected in household exposures, can cause malignant mesothelioma.” *Id.* In 2011, a survey of the literature found at least thirty “studies and cases from all over the world, where the overwhelming evidence is that chrysotile asbestos was the primary or only asbestos exposure.” **Ex. 24**, Kanarek, *Mesothelioma from Chrysotile Asbestos: Update*, ANN EPIDEMIOL 21:688-697, 695 (2011). The authors concluded that “[t]here are many well-documented cases of mesothelioma from chrysotile asbestos in case-reports and epidemiology studies from all over the world.” *Id.* at 695.

Indeed, virtually every group of scientists that has ever examined the question has found that reliable data show a causal relationship between chrysotile asbestos and mesothelioma. As discussed *supra*, in 1997, an interdisciplinary group of epidemiologists, pathologists, industrial hygienists and other experts on asbestos-related disease gathered in Helsinki, Finland. The consensus among the scientists was that both chrysotile and amphibole fibers are capable of causing mesothelioma in human beings. *See* Consensus Report, *supra*.

In 1979, the highly respected International Agency for Research on Cancer (IARC) published a monograph reporting that all types of commercial asbestos fibers had been found to produce mesothelioma. IARC Monograph (Sept. 1979). The IARC, which is generally considered the leading scientific authority on carcinogenic substances, follows a rigorous and comprehensive review process.

The original IARC Monograph on asbestos was developed by the world's leading authorities on asbestos research, including Dr. Irving Selikoff and Dr. J.C. Wagner. IARC met again in 2009 to reassess the carcinogenicity of asbestos. A group of 27 international scientists concluded that, "[e]pidemiological evidence has increasingly shown an association of all forms of asbestos (chrysotile, crocidolite, amosite, tremolite, actinolite, and anthophyllite) with an increased risk of lung cancer and mesothelioma." **Ex. 25**, *A Review of Human Carcinogens – Part C: Metals, Arsenic, Dust, and Fibres*, THE LANCET, 10:453-454 (2009). In 2012, these conclusions were included in the updated IARC monograph on asbestos.

On June 4, 2012, the Joint Policy Committee of the Societies of Epidemiology issued its Position Statement on Asbestos. **Ex. 26**, Joint Policy Committee of the Societies of Epidemiology, *Position Statement on Asbestos*, at 2 (2012). This is a consortium of epidemiology societies and organizations, both national and international, including the American College of Epidemiology. This consortium of epidemiological societies found that "[a] large number of studies have reported an excess of mesothelioma and lung cancer among workers who were predominantly exposed to chrysotile asbestos," *id.* at 11, and that "evidence from other scientific disciplines also demonstrates that chrysotile alone causes not only lung cancers (and asbestosis), but also pleural and peritoneal mesothelioma." *Id.* at 13.

In 1998, the WHO's International Programme on Chemical Safety (IPCS) published an exhaustive report on chrysotile asbestos. After analyzing data from more than 400 scientific articles, the IPCS concluded that "[c]ommercial grades of chrysotile have been associated with an increased risk of pneumoconiosis, lung cancer and mesothelioma in numerous epidemiological studies of exposed workers." **Ex. 49**, WHO, *Environmental Health Criteria 203: Chrysotile Asbestos* (1998) ("EHC 203"), at ¶ 1.6. The report analyzed all of the available scientific data, including epidemiological studies, tissue studies, and repeated *in vivo* and *in vitro* experiments. The data demonstrated that "[e]xposure to chrysotile asbestos poses increased risks for asbestosis, lung cancer and mesothelioma in a dose-dependent manner" and that no "threshold has been identified for carcinogenic risks." *Id.* at ¶ 10.

In 2004, the American Cancer Society's revised guide to mesothelioma stated that, "the more commonly used chrysotile fibers are associated with malignant mesotheliomas and should be considered

dangerous as well.” American Cancer Society, *Detailed Guide: Malignant Mesothelioma* (Dec. 21, 2004).

Regulatory agencies throughout the world have relied on a body of scientific evidence linking chrysotile asbestos and mesothelioma. In 2000, the World Trade Organization gathered an independent panel of scientists to assess the health effects of chrysotile asbestos, in order to determine whether Canada should be permitted to export chrysotile. The assembled scientists agreed that chrysotile asbestos caused mesothelioma. *See, e.g.*, WTO Report, *supra*, at ¶ 5.267. The WTO Panel concluded that chrysotile products posed a health risk to “downstream” users, “in particular as regards lung cancer and mesothelioma.” *Id.* at ¶ 8.194.

Governmental agencies in the United States have reached the same conclusion. In 1977, the Consumer Product Safety Commission (CPSC) banned an entire class of joint compounds containing chrysotile asbestos, finding that the products posed an “unreasonable risk of injury to the public.” **Ex. 47**, 16 C.F.R. § 1304.5. Specifically, the Commission found that the products posed the risk of causing both lung cancer and mesothelioma.

In 1986, after reviewing 55,000 pages of epidemiological studies, scientific articles and voluminous testimony “concerning the toxicity and carcinogenicity of different asbestos fiber types,” OSHA determined that “all fiber types, alone or in combination, have been observed in studies to induce lung cancer, mesothelioma, and asbestosis in exposed workers.” OSHA, *Occupational Exposure to Asbestos, Tremolite, Anthophyllite, and Actinolite; Final Rules*. In 1994, OSHA again reviewed the scientific evidence and reaffirmed its original conclusion that chrysotile asbestos presented a significant mesothelioma risk to exposed workers. In 2014, OSHA again published that “[e]pidemiological evidence has increasingly shown that all asbestos fiber types, including the most commonly used form of asbestos, chrysotile, causes mesothelioma in humans.” **Ex. 63**, OSHA: Asbestos (2014).

In 1989, the EPA relied on both the epidemiological studies and “numerous animal studies [that] have demonstrated that chrysotile is at least as potent as amphiboles in inducing both mesothelioma and lung cancer by inhalation, as well as by injection or implantation.” EPA, *Asbestos: Manufacture,*

*Importation, Processing and Distribution in Commerce Prohibitions; Final Rule*. The EPA reviewed the scientific literature on chrysotile again in 1999 and 2000 and found nothing “that persuasively contradicted the risk assessment approach” with respect to chrysotile asbestos. EPA, *Asbestos Worker Protection, Final Rule* (Nov. 15, 2000).

The U.S. Mine Safety and Health Administration has rejected the notion that the risk of mesothelioma differs by fiber type, choosing to treat all six asbestos minerals the same. **Ex 48**, MSHA, Asbestos Exposure Limit; Final Rule, 73 Federal Register 41, 11291-92 (Feb. 29, 2008). In 1997, the U.S. Department of Health and Human Services stated that “both epidemiologic evidence and experimental confirmation indicate that chrysotile, amosite, and crocidolite asbestos are causative agents for mesothelioma.” U.S. Dep’t of Health and Human Services, *Asbestos Bibliography* (Sept. 1997), at 86. In 1998, the NIOSH reiterated that chrysotile causes mesothelioma, and “[t]herefore, all occupational groups exposed to asbestos are at risk of developing asbestos-related pleural malignancy.” NIOSH, *Atlas of Respiratory Disease Mortality, United States: 1982-1993*.

Published epidemiological studies demonstrate significantly increased rates of mesothelioma, often more than double what was expected in chrysotile-exposed populations.<sup>7</sup> The WHO reviewed the extensive epidemiological literature in 1998 and concluded that “[c]ommercial grades of chrysotile have been associated with an increased risk of pneumoconiosis, lung cancer and mesothelioma in numerous epidemiological studies of exposed workers.” EHC 203, *supra*, at ¶ 1.6. The report further notes that although epidemiological studies have primarily involved the mining, milling and manufacturing sectors, “there is evidence, based on the historical pattern of disease associated with exposure to mixed fibre types in western countries, that risks are likely to be **greater** among workers in construction and possibly other user industries.” *Id.* (emphasis added). In 2006, the WHO unequivocally stated that, “all types of

---

<sup>7</sup> Tissue studies also establish the carcinogenicity of chrysotile asbestos. There is “good evidence from lung burden studies . . . that chrysotile alone can cause mesothelioma.” Malignant Mesothelioma 230 (Henderson, et al., eds. 1992). Studies of human tissue demonstrate that chrysotile fibers concentrate in the pleura, where most mesotheliomas develop. See **Ex. 45**, Suzuki & Yuen, *Asbestos Tissue Burden Study on Human Malignant Mesothelioma*, Indus. Health 39:150-160 (2001).

asbestos cause asbestosis, mesothelioma, and lung cancer.” WHO Position on Asbestos, May 5, 2006. The WHO concluded that “[e]xposure to chrysotile asbestos poses increased risks for asbestosis, lung cancer and mesothelioma in a dose-dependent manner” and that no “threshold has been identified for carcinogenic risks.” EHC 203, *supra*, at ¶ 10.

Several studies have confirmed that chrysotile asbestos alone is associated with an increase risk of mesothelioma. *See, e.g.*, **Ex. 43**, Robinson, *Advances in Malignant Mesothelioma*, N Engl J Med 353(15):1591 (Oct. 2005); **Ex. 44**, R.P. Everatt et al., *Occupational Asbestos Exposure Among Respiratory Cancer Patients in Lithuania*, Am. J. Indus. Med., Supplement 50:455-463, 457, 462 (2007); **Ex. 50**, S.V. Kashansky et al., *Retrospective View of Airborne Dust Levels in Workplace of a Chrysotile Mine in Ural, Russia*, Indus. Health, 39:51-56 (2001); **Ex. 51**, S.V. Shcherbakov et al., *The Health Effects of Chrysotile Asbestos: Contribution of Science to Risk-Management Decisions*, Can. Mineral., Spec. Publ. 5:187-198 (2001); **Ex. 52**, Tossavainen et al., *Health and Exposure Surveillance of Siberian Asbestos Miners: A Joint Finnish-American-Russian Project*, Am J Ind Med Supp 1:142-144 (1999); **Ex. 54**, Frank et al., *Carcinogenic Implications of the Lack of Tremolite in UICC Reference Chrysotile*, Am J Ind Med 34:314-317 (1998); **Ex. 56**, Cullen and Baloyi, *Chrysotile Asbestos and Health in Zimbabwe: Analysis of Miners and Millers Compensated for Asbestos-Related Disease Since Independence (1980)*, Am J Ind Med 19:161-169 (1991); **Ex. 66**, Sturm et al., *Use of asbestos, health risks and induced occupational diseases in the former East Germany*, Toxicology Letters 72:317-324 (1994); M.T. Madkour, *Environmental exposure to asbestos and the exposure-response relationship with mesothelioma*, E. Mediterranean Health J. 15(1):25-38, 32 (2009); D. Loomis et al., *Lung cancer mortality and fibre exposures among North Carolina asbestos textile workers*, Occup and Envir Med. 66(8):535-542 (Aug. 2009); G. Aguilar-Madrid, *Case-control Study of Pleural Mesothelioma in Workers with Social Security in Mexico*, Am. J. Indus. Med. 53:241-251, 242 (2010). In sum, there is overwhelming scientific consensus for Dr. Mark’s and Dr. Brody’s opinion that chrysotile asbestos causes mesothelioma.

C. **It is generally accepted in the medical and scientific community that exposure to asbestos-containing brake dust causes mesothelioma.**

1. Numerous studies support Dr. Mark's opinion that asbestos-containing brakes cause mesothelioma.

Contrary to Honeywell's contention that "epidemiological literature on the relationship between vehicle repair and mesothelioma concludes that neither vehicle repair nor brake work at any level increases the risk of mesothelioma" (Doc. 381 at 22), there are numerous epidemiological studies finding an increased risk of mesothelioma in individuals who have breathed brake dust. Recently, a published, peer-reviewed epidemiological study found that auto mechanics had a statistically significant risk of developing mesothelioma. **Ex. 27**, Roelofs et al., *Mesothelioma and Employment in Massachusetts: Analysis of Cancer Registry Data 1988-2003*, Am J Indus Med 56(9):985-992, Table II (2013). It was noted that auto mechanic exposure was from cleaning asbestos-containing vehicle brakes. *Id.* at 7.<sup>8</sup> Similarly, in the recent survey of chrysotile literature by Kanarek, cited *supra*, the authors concluded that exposure to chrysotile asbestos in brake friction products causes mesothelioma. They noted that low exposures are capable of causing mesothelioma, and that it is "universally accepted that it takes a greater exposure to asbestos to cause asbestosis than the amount needed for mesothelioma carcinogenicity." Kanarek, *supra*, at 696. The authors therefore concluded that, **"in worker groups, like brake workers, where there has been excess asbestosis, these workers have definitely been exposed to asbestos levels enough for mesothelioma carcinogenicity."** *Id.* (emphasis added). The fact that some brake workers develop asbestosis from installation and removal of asbestos-containing friction products is worthy of emphasis. There is no dispute that the development of the disease, asbestosis, unlike malignant mesothelioma, requires high levels of repeated asbestos exposure. Asbestos friction products are therefore the kind of asbestos products that creates high-dose asbestos exposures, not merely low level, and certainly not "trivial" ones, as Defendants erroneously contend.

---

<sup>8</sup> Ford and Honeywell criticize Dr. Mark's reliance on Roleofs, but their own expert, Dr. David Garabrant, also relies on this same study. (Doc. 296-3 at 9).

Mesothelioma is commonly seen in cohorts that include auto mechanics. **Ex. 69**, Leigh, *Malignant Mesothelioma in Australia, 1945-2000*, Am J Ind Med 41:188-201 (2002); **Ex. 71**, Rosler and Woitowitz, *Recent Data on Cancer Due to Asbestos in Germany*, Med Lav 86(5):440-448 (1995); **Ex. 72**, Jung et al., *A Decade of Malignant Mesothelioma Surveillance in Korea*, Am J Ind Med (2012); **Ex. 75**, Langer, *Mesothelioma in a Brake Repair Worker*, Lancet (Nov. 13, 1982); **Ex. 107**, Pukkala et al., *Occupation and cancer- follow-up of 15 million people in five Nordic countries*, Acta Oncologica 48:646-790 (2009); Skammeritz et al., *Asbestos Exposure and Survival in Malignant Mesothelioma*, *supra*.

The Pukkala study is particularly instructive, as the authors looked at a very large cohort, 15 million people, and found that mechanics were one of the occupations with a “high risk” of mesothelioma. Pukkala, *supra*, at 703. As a group, mechanics had a doubling of the risk of mesothelioma. *Id.* at 704, Table 37. All occupational categories, including mechanics, that had an increased risk of mesothelioma were occupations involving exposure to asbestos. *Id.* at 703. The findings of Skammertiz were also notable, as 9 of the mesotheliomas in the cohort worked in the automobile industry, which represented 6.3% of the mesotheliomas in the study. Skammertiz, *supra*, at 228, Table 2. As Skammeritz made clear, the background population of malignant mesothelioma, absent occupational asbestos exposure, was quite low in the general population. A finding of 9 malignant mesotheliomas among automobile workers is a very significant indicator of the pathogenic effects, specifically for mesothelioma, of asbestos exposure in their work.

Numerous other scientific publications have also found that exposure to asbestos brake friction products is hazardous and increases the risk of disease. *See Ex. 28*, McDonald, et al, *Epidemiology of Primary Malignant Mesothelial Tumors in Canada*, Cancer, 26(4):914-9 (1970); **Ex. 29**, Vianna & Polen, *Non-Occupational Exposure to Asbestos and Malignant Mesothelioma in Females*, The Lancet, May 1978; **Ex. 30**, Report of the Panel, European Communities – Measures Affecting Asbestos and Asbestos-Containing Products, WTO September 18 2000; **Ex. 76**, Hansen, *Mortality of auto mechanics: A ten-year follow-up*, Scand J Work Environ Health, 15:43-46 (1989); **Ex. 58**, Lorimer et al., *Asbestos Exposure of Brake Repair Workers in the United States*, Mt Sinai J 43(3):207-218 (1976), a study paid for by Ford



years *before* it began financing papers for its defense in asbestos products litigation; **Ex. 70**, Finkelstein and Meisenkothen, *Malignant Mesothelioma Among Employees of a Connecticut Factory that Manufactured Friction Materials Using Chrysotile Asbestos*, Ann Occup Hyg 54(6):692-696 (2010).

Studies have found large amounts of chrysotile asbestos fibers present in brake dust. **Ex. 59**, Atkinson et al., *Evaluation of the Size and Type of Free Particulates Collected from Unused Asbestos-Containing Brake Components as Related to Potential for Respirability*, Am J Ind Med 46:545-553 (2004). Studies have also documented substantial asbestos exposures from brake dust. **Ex. 60**, Salazar et al., *Asbestos Exposure among Transmission Mechanics in Automotive Repair Shops*, Ann Occup Hyg 1-15 (2014); **Ex. 61**, Garcia-Gomez et al., *Asbestos-related occupational cancers compensated under the Spanish National Insurance System, 1978-2011*, Intl J Occup Env Health 21(1):31-39 (2015); *see also* **Ex. 62**, Friction Materials Standards Institute, Minutes of Asbestos Study Committee, Feb. 16, 1973.

In 2007, a group of 52 scientists who are experts in asbestos-related diseases concluded that the scientific literature does support the conclusion that exposure to asbestos-containing brake dust causes mesothelioma:

**The scientific literature contains hundreds of cases of mesothelioma among brake mechanics; and epidemiologic studies of mechanics known to have performed repair work on asbestos-containing brakes have demonstrated increased levels of nonmalignant diseases. This combination of evidence, and the vast amount of additional scientific information regarding asbestos and mesothelioma, provides more than sufficient evidence to allow someone to conclude within a reasonable degree of scientific certainty that a mesothelioma in a mechanic who worked with asbestos-containing brakes was caused by that asbestos exposure.**

Welch, *supra*, at 323 (emphasis added).

2. Outside of litigation, Ford and Honeywell agree that exposure to asbestos-containing brake dust causes mesothelioma.

Both Honeywell and Ford have recognized, outside of litigation, that their asbestos-containing brakes cause mesothelioma. In 1994, Ford's issued an instruction manual for its mechanics titled "General Brakes Theory and Operation," in which it flat out states that dust present on Ford brake assemblies may contain asbestos and that breathing the dust from its brakes can cause cancer. **Ex. 38**, Ford Brake Systems, General Brakes Theory and Operation: Self-Study Student Reference Book, at second page. The

Material Health and Safety Data Sheets (MSD Sheets) for Ford asbestos-containing products now state that asbestos can cause mesothelioma. **Ex. 88**, Ford MSD Sheets. The training program Ford endorses for its dealers across the United States also cautions that work on asbestos brakes causes mesothelioma. **Ex. 89**, Ford S/P2 Endorsement; *see also* **Ex. 90**, Ford's Endorsement of the EPA "Don't Blow It" Video.

Similarly, in 1986, its Material Safety Data Sheet for "Bendix Friction Materials," the very product at issue in this case, Honeywell states that its product can cause mesothelioma. **Ex. 5**, Allied-Signal, Inc., Bendix Friction Materials Division, Material Safety Data Sheet, at Section VI ("Health Hazard Data"). It further states that "machining (grinding or drilling) and/or normal use may create asbestos dust or airborne asbestos fibers in excess of OSHA standard [sic] and should be considered hazardous." *Id.* at Section IX ("Special Precautions").

In addition, Honeywell's own asbestos standard governing its facilities worldwide recognizes the extreme dangers of asbestos. It provides that asbestos-containing materials (ACM) should not even be purchased for use in Honeywell facilities. **Ex. 6**, Honeywell HSE Management System, Level 2 Standard, Industrial Hygiene, Asbestos, Effective Date 1/31/13, at 2. The standard states that if employees encounter ACM, "including encapsulated materials," they must stop work on notify their supervisor immediately. *Id.* Honeywell's standard in fact *prohibits* the "[d]ry machining, cutting, grinding, sanding or abrading of ACM (friable and non-friable)." *Id.* The standard recognizes that, "the OEL's [Occupational Exposure Limits] were established at the lowest exposure levels that could be reliably measured and there is evidence suggesting that chronic exposures to asbestos at levels below the OEL's pose sufficient risk to justify the use of respirators whenever engaged in Asbestos Work." *Id.* at 10. Honeywell also defines asbestos to include chrysotile asbestos. *Id.* at 9.

Honeywell has in fact known since 1973 that exposure to brake friction products causes mesothelioma. **Ex. 91**, Friction Materials Standards Institute, Minutes of Annual Meeting, June 27-28, 1973. A representative of the Friction Materials Division of Honeywell's predecessor, Bendix, attended a meeting of the Friction Materials Standards Institute in 1973 in which he was told in no uncertain terms that exposure to asbestos-containing brake dust causes mesothelioma. At that meeting, it was discussed

that there is a scientific consensus that chrysotile asbestos causes mesothelioma, including exposure to chrysotile asbestos in brakes:

Probably the most significant event that occurred during the past year on the subject of asbestos hazards was the meeting of the International Agency for Research on Cancer that was held at Lyon, France last October. This meeting was attended by more than a hundred thirty medical researchers and representatives of government, industry and labor from virtually every major asbestos consuming or producing country in the world. For four days intensive sessions on asbestos were held by three different panels, each made up of ten to twenty-five of the **foremost medical and scientific experts operating in the various fields of asbestos-health research**. Following the meetings the committees issued a combined report on asbestos cancers. I think the following [] items summarize their most important conclusions:

- (1) All major commercial types of asbestos can cause cancer . . . .
- (3) Evidence has been greatly strengthened that all commercial types of asbestos except Anthophyllite may be responsible for mesothelioma. (Risk is greatest with Crocidolite, less with Amosite, and apparently still less with Chrysotile)  
. . . .

**The most important item here is the incrimination of all major types of asbestos as causal agents for carcinoma, particularly mesothelioma . . . . Since most of us use substantial amounts of Chrysotile asbestos in our formulations, association of this material with mesothelioma and other types of cancer is of serious concern.**

*Id.* at “Asbestos and the Friction Material Industry,” at 1-2 (emphasis added).

3. In their motions, Ford and Honeywell rely on studies that are purely litigation products brought and paid for by Ford as part of a calculated defense strategy.

In contrast to their positions outside the courtroom, in their motions Ford and Honeywell claim that the scientific evidence does not support a link between asbestos-containing brake dust and mesothelioma. They contend that the epidemiological literature contradicts Dr. Mark’s opinion that exposure to asbestos-containing brake dust causes mesothelioma, and they fault Dr. Mark for not relying on this supposed “science.” The evidence shows, however, that much of the literature they accuse Dr. Mark and Dr. Brody of “ignoring,” (Doc. 383 at 6), is not genuine science but is part of a concerted (and expensive) effort to corrupt the asbestos brake literature with defense-funded pseudoscience. Ford, Chrysler, and General Motors have hired defense-oriented scientific consulting firms, ChemRisk and Exponent, to write articles that attempt to cast doubt on the well-established link between asbestos-containing brake dust and asbestos disease. Exponent’s records show that Ford and other automakers have

paid Exponent approximately \$1.1 million for eleven articles about asbestos brakes. **Ex. 92**, Allen- List of Papers; **Ex. 93**, Schlenker Depo., 8/28/14, at 24:6-30:5, 44:11-46:16. Ford's records show that Ford alone paid Exponent almost \$13 million for asbestos articles between 2001 and 2011. **Ex. 94**, Exponent Asbestos Payments Made by Ford from 1/1/2001 to 12/21/2011; Schlenker Depo. at 63:11-66:3.

This careful asbestos defense litigation strategy was acknowledged by the lead scientist at the consultant firm ChemRisk, whom Ford has apparently paid millions of dollars in asbestos matters. **Ex. 95**, Paustenbach Letter to Ford, 12/28/10. Dr. Paustenbach noted that, "ChemRisk has had a long standing relationship with Ford," and told Ford that he has "tried to go the extra mile to try to satisfy your needs." *Id.* at 1, 5. He further noted that ChemRisk has conducted "asbestos related research which resulted in publications which have been enormously illuminating to the courts and juries." *Id.* at 6. Specifically, **"these papers have changed the scientific playing field in the courtroom.** You know this better than anyone as you have seen the number of plaintiff verdicts decrease and the cost of settlement go down over time." *Id.* (emphasis added). Further, "all" of Ford's experts "base the background of their testimony on our published papers." *Id.* at 6-7. Dr. Paustenbach then cited a recent ChemRisk paper which required no less than \$300,000 of work. *Id.* at 7. The ultimate goal of this letter was to convince Ford to accept an increase in ChemRisk's billing rates given this "long standing" symbiotic relationship.

Thus, when Ford contends that "[s]cience has progressed to firmly establish that exposure to chrysotile-containing automotive parts does **not** cause mesothelioma," it means this in the most cynical sense. (Doc. 383 at 7). This alleged "progression" is not the result of any sort of natural evolution of scientific thinking, it is quite the opposite—Ford's payments to firms like Exponent and ChemRisk have artificially and intentionally resulted, in the paid author's mind, in "papers [that] have changed the scientific playing field in the courtroom." Paustenbach Letter, at 6.

In attacking Plaintiffs' experts, Ford and Honeywell rely heavily on an affidavit from defense expert Dr. David Garabrant,<sup>9</sup> but a review of his affidavit shows that he not only relied on many of the

---

<sup>9</sup> This late-filed affidavit from Dr. Garabrant is the subject of a pending Motion to Strike for failure to comply with the Court's deadlines for expert reports. (Docs. 311-12).

Ford-funded studies by Exponent, he is in factor the author of one of those defense-funded studies. Dr. Garabrant's affidavit cites articles by Hessel, Goodman, Paustenbach, Kelsh, and Teta that are listed in Exhibit 92 as studies paid for by Ford. (Doc. 296-3 at 5, 11, 15-17). For example, the Hessel study was funded by Ford, Chrysler, and General Motors in the amount of \$56,662. (Doc. 296-3 at 5, 8, 11, 15); Allen- List of Papers. Dr. Garabrant also relies on the Paustenbach article that Ford paid \$454,953 for, "*Environmental and occupational health hazards associated with the presence of asbestos in brake linings and pads: (1900 to present)*." (Doc. 296-3 at 17); Allen- List of Papers.

Dr. Garabrant also relies on his own study, co-authored with Goodman in 2004, *Mesothelioma and Lung Cancer Among Motor Vehicle Mechanics: a Meta-analysis*. (Doc. 296-3 at 15). Ford paid \$105,635 for the article by Dr. Garabrant that Dr. Garabrant has turned around used as reliance materials in his affidavit submitted in this litigation on behalf of Ford and Honeywell. Allen- List of Papers.

Documents show that payments to Exponent and ChemRisk for industry-friendly brake studies were made pursuant to a "Joint Defense Agreement" among brake manufacturers, their attorneys, and Exponent. **Ex. 96**, Redacted documents produced by Exponent. Meeting agendas and assigned "tasks" regarding the creation of these studies were labeled "Attorney Work Product," and demonstrate the key role that Ford's attorneys have taken in acquiring brake studies to be used in litigation. Exponent produced these documents in discovery in asbestos litigation in Illinois, where the documents were ruled to be admissible and not subject to any applicable privilege. **Ex. 97**, Order by Judge Stephen A. Stobbs, Circuit Court for Madison County, IL, 1/30/15.

There can be no doubt that the articles Ford and Honeywell now rely on to attack Dr. Mark were products commissioned by Ford's attorneys for this purpose. Among other things, the Joint Defense Agreement documents show that "Friction Materials Project Epidemiology Consulting" tasks included preparing manuscripts and "coordination with experts and counsel." **Ex. 96** at bates no. EXP002126. The documents show that there were meetings with lawyers and Dr. Garabrant regarding the "meta analysis" he co-authored with Dr. Goodman. *Id.* at bates no. EXP002129, EXP002136. A meeting agenda from April 15, 2002, reveals that four separate manuscripts were ordered for \$30,000 each, on the topics of

“[b]rake mechanic exposure,” “[b]rake mechanic epidemiology,” “[s]tandard-of-care case study,” and “[h]istory of the use of friction materials in automobiles.” *Id.* at bates no. EXP002142.

Ford and Honeywell also cite additional industry-funded studies that apparently even Dr. Garabrant would not touch. For example, the Langer study attached as Exhibit I to Honeywell’s motion states at the very end that relied on research funded in part by Ford. (Doc. 381-9 at 76). Honeywell and Ford also repeatedly mention a recent “animal inhalation study” by Bernstein that Plaintiffs’ experts supposedly should have relied on. This study was funded by Honeywell. (Doc. 381-12 at 45; Doc. 381-13 at 33). Other scientists have completely rejected the findings of the Bernstein study as scientifically flawed, obviously biased, and part of a campaign by asbestos defendants to spread misinformation about chrysotile asbestos:

The asbestos industry promotes the notion that chrysotile asbestos is safer than other forms of asbestos. This is reflected in a recently published paper by Bernstein on health risks of chrysotile asbestos. However, **this paper is scientifically flawed, including only selected literature and limited clinical and scientific knowledge.** Based mainly on his own published animal studies, frequently with a limited follow-up of 90-360 days, the author concludes that when properly controlled, cement workers can safely use chrysotile asbestos.

However, **available literature provides abundant evidence to the contrary. Many studies demonstrate adverse health effects from chrysotile asbestos in human beings and animals . . . .** Numerous well-respected international and national scientific organizations, through an impartial and rigorous process of deliberation and evaluation, have concluded that all forms of asbestos are capable of inducing mesothelioma, lung cancer, asbestosis, and other diseases. Conclusions are based on the full body of evidence, including the epidemiology, toxicology, industrial hygiene, biology, pathology, and other related literature published to the time of the respective evaluations.

**Ex. 98**, Baur et al., *How conflicted authors undermine the World Health Organization (WHO) campaign to stop all use of asbestos: spotlight on studies showing that chrysotile is carcinogenic and facilitates other non-cancer asbestos-related diseases*, Intl J. Occup Env Health 21(2):176-179, 176-77 (2015) (end notes omitted, emphasis added).

Other scientists have recognized the auto industry’s charade and refused to go along with it, recognizing that the results of these defense-sponsored studies on brakes “veer[] from accepted, reliable mainstream scientific methods and conclusions.” Welch, *supra*, at 321. Having reviewed the publications

and the arguments and evidence commonly offered by brake defendants that asbestos in brakes is harmless and incapable of causing disease, 52 eminent pathologists, epidemiologists, toxicologists, public health physicians and other scientists engaged in the field of asbestos and asbestos diseases from prestigious universities and colleges throughout the world concluded that this assertion “is simply not scientifically supportable.” *Id.* These experts first note that the studies relied upon by the Defendants are fraught with individual shortcomings that limit their applicable universality, citing peer-reviewed criticisms. *See, e.g., Exs. 73-74.* They then relate that, “[f]ar from proving that no person can ever get sick from asbestos dust released by brakes, the best that can be said for the studies is that they are inconclusive. Instead, such a claim is based on the scientifically unsupportable proposition that one study, or group of studies, trumps all other evidence, no matter how extensive and well-documented that evidence is.” Welch, *supra*, at 321. They then conclude that, “[d]espite the best efforts of the asbestos brake manufacturers and their hired experts to fabricate scientific uncertainty where none exists, the mainstream scientific community and regulatory communities have considered the available evidence and concluded that the danger to mechanics from asbestos in brakes is real.” *Id.* at 323 (emphasis added).

The EPA has also declined to accept the brake industry’s claims about the safety of their products. When it was first published in 1986, the EPA “Gold Book,” an informational pamphlet on brake maintenance and asbestos disease, advised anyone working with asbestos brakes that mesothelioma “can be caused by very low exposures to asbestos” and that “[t]his cancer has occurred among brake mechanics, their wives, and their children.” **Ex. 31**, Guidance for Preventing Asbestos Disease Among Auto Mechanics, EPA, at 2 (1986). Recently, attorneys representing the automobile industry formally requested that the EPA eliminate this language and revise the pamphlet to reflect the “new” science. **Ex. 32**, Michaels & Monforton, *How Litigation Shapes the Scientific Literature: Asbestos and Disease Among Automobile Mechanics*, *Journal Law Pol’y*, XV(3): 1137-1169 (2007). The EPA, however, declined to do so and its revised brochure did not mention anything about asbestos brake dust being incapable of causing any type of disease. **Ex. 33**, Current Best Practices for Preventing Asbestos Exposure Among Brake and

Clutch Repair Workers, EPA (2007); *see also* **Ex. 34**, Asbestos-Automotive Brake and Clutch Repair Work, OSHA (2006) (exposure to asbestos from brakes can cause mesothelioma *citing* Lemen, *Asbestos in Brakes: Exposure and Risk of Disease*, *Amer J Ind Med* 45:229-237 (2004)).

Like the EPA, no other scientific or regulatory group has ever taken the position that brake dust is different than asbestos or that brakes do not cause mesothelioma. Even after all of the automotive industry's efforts to plant defense-oriented studies in the scientific literature, the consensus view still rejects this pseudoscience. Within the past year, the group of preeminent international scientists who published the Consensus Report met again to update their conclusions, and their **new Consensus Report does not distinguish brake friction products from other asbestos products**. Consensus Report 2014, at 6. The Consensus Report did not rely on the views of Ford and Honeywell's testifying experts, and those experts were not present as part of the consensus group, with one notable exception—Dr. Roggli, who agrees with Dr. Mark and Dr. Brody on virtually all of their opinions about the ability of asbestos exposure to cause mesothelioma. Consensus Report 2014, at 14. If Dr. Roggli sought to convince the other scientists in that consensus group that brakes are different, he failed.

In 2005, the International Journal of Occupational and Environmental Health (in conjunction with a number of leading doctors and scientists) published an article entitled *Abuse of Epidemiology: Automobile Manufacturers Manufacture a Defense to Asbestos Litigation*. The article notes that “much of the ‘debate’ about the relationship between asbestos exposure from automobile brake work and asbestos-induced cancer has been fueled by studies that have been funded by corporations with billions at stake in tort litigation. The authors explore how asbestos-lined brake manufacturers have corrupted medical literature to escape liability, analyzing studies funded by these companies to enable them to claim that work with asbestos brake linings never causes mesothelioma . . . .” **Ex. 35**, Egilman, M.D., et al., *Abuse of Epidemiology: Automobile Manufacturers Manufacture a Defense to Asbestos Litigation*, *Int'l J. Occup. & Environ Health*, 11:360-371 (2005).

Yet another article addressing the efforts (and techniques) employed by manufacturers to distort and misrepresent the well-accepted causal relationship between exposure to asbestos and asbestos-related



malignancies is Freeman and Kohles, *Assessing specific causation of mesothelioma following exposure to chrysotile asbestos-containing brake dust*, Int'l J Occup Env Health 18(4):329-336 (2012), **Ex. 36**. The authors address the “debate” about whether exposure to brake dust causes mesothelioma, noting that “[i]t is unlikely that this debate would exist if it were not for defective product litigation that is associated with individual mesothelioma and asbestos exposure claims.” *Id.* at 329. In the face of the scientific consensus that exposure to asbestos brakes increases the risk of mesothelioma, brake manufacturers employ “doubt science” by arguing that there is not in fact convincing evidence that brake exposure causes mesothelioma. *Id.* at 330. The specific arguments made by the brake industry have been rejected by many scientists “as irrelevant, biased, misleading, sophistic, and flat out incorrect.” *Id.* The authors set out to examine the specific claims made by the brake industry, and Defendants in this case, to determine whether they had any validity, and found that, “[i]t is reasonable to conclude that the ‘net’ of evidence supporting a causal nexus between brake dust exposure and mesothelioma favors causation, and that the weak ‘strands’ indicated by industry scientists as evidence to the contrary either do not exist or are greatly outweighed by the evidence to the contrary.” *Id.* at 332. They further conclude that the brake industry’s contention that chrysotile does not cause mesothelioma “is, in fact, specious.” *Id.* at 335.

4. Other studies relied on by Defendants do not support their position that asbestos-containing brakes do not cause mesothelioma.

The few truly independent studies relied on by Ford and Honeywell do not in fact support their broad position that brake exposure does not cause mesothelioma. One of the studies relied on by Dr. Garabrant and in Defendants’ motions is a 1997 study by Dr. Kay Teschke. (Doc. 381 at 22 n.25; Doc. 296-3 at 7). Dr. Teschke has disavowed the interpretation that Defendants have given to her study. **Ex. 99**, Letter from Teschke Letter, 12/30/11. Dr. Teschke has explained that her study does not prove that asbestos from friction products is not dangerous and was not designed to test the question of whether asbestos from brake friction products causes disease. *Id.* at 3. Her study included only a relatively small number of people with mesothelioma, only six of whom had ever worked as a vehicle mechanic and only two of those reported doing any brake repair work; none reported brake repair work as an occupation. *Id.*

Dr. Teschke has explained that, “the risk estimates calculated for both these groups had wide confidence intervals, neither of which were inconsistent with an elevated risk. We did not collect any information about the frequency of brake work, and therefore had no indication of the intensity or cumulative exposure of the cases or controls.” *Id.*

Further, Dr. Teschke is of the opinion that, “[b]rake lining replacement and repair work . . . includes numerous activities that produce high levels of airborne asbestos dust, including using compressed air for cleaning the brake area, sanding brake lining surfaces, and filing edges of brake linings.” *Id.* at 2. She explained that the airborne asbestos levels from these activities “regularly exceeded the current OSHA PEL [permissible exposure limit], often by 2- to 10-fold and sometimes by as much as 100-fold.” *Id.* “Cleaning with compressed air and sanding and grinding friction products have been shown to create hazardous levels of airborne asbestos dust, and because of this, these specific operations have become subject to regulatory restrictions.” *Id.*

Dr. Teschke also disagrees with the notion, advanced by Ford and Honeywell, that job titles or occupation can be used as a surrogate for understanding whether a person had substantial exposure to asbestos. *Id.* at 4. In her opinion, “[t]he question to ask is whether asbestos causes mesothelioma.” *Id.* She notes that, “[t]he epidemiological literature has shown strong and consistent associations between asbestos exposure and mesothelioma.” *Id.* at 3. Whether or not a specific individual had sufficient exposure to increase the risk of asbestos-related disease entirely depends on that person’s own individual work activities with asbestos products: “[t]he question of whether an exposure agent can cause a disease within a specific occupation is not a question about the occupation, but a question about the exposure of the individuals within the occupation.” *Id.* at 3. The specific experiences of car mechanics differ so significantly that mechanic jobs and “brake repair work as a task within jobs would not be a good tests of the relationship between asbestos and mesothelioma.” *Id.* at 4.

Finally, Dr. Teschke is one of the 52 scientists that signed the Welch paper that strongly sets forth disagreement with industry-funded efforts to create doubt about the relationship between asbestos brakes and mesothelioma. Welch, *supra*, at 325. She has explained that she “signed this article because I believe

the analysis and the science on which it was based are sound.” Teschke Letter, at 5. Defendants’ efforts to portray Dr. Teschke’s study as antithetical to Dr. Mark’s opinions in this case are therefore disingenuous and misleading.

**IV. DR. MARK’S AND DR. BRODY’S OPINIONS HAVE BEEN ADMITTED BY OTHER COURTS AS RELIABLE AND HELPFUL TO THE TRIER OF FACT.**

Numerous courts have admitted Dr. Mark’s special exposure opinion as reliable causation testimony. In *Mahoney v. Georgia-Pacific, LLC*, No. A122038, 2009 WL 3451754 (Cal. App. Ct. Oct. 27, 2009) (**Ex. 12**), the plaintiff offered Dr. Mark’s testimony that her asbestos exposure from Georgia-Pacific joint compound through sanding and clean-up activities was a substantial contributing factor in the development of her mesothelioma. *See id.* at \*2. In considering Georgia-Pacific’s challenge to this testimony on appeal, the court noted that Dr. Mark is “a Harvard-educated physician and pathologist who taught at Harvard Medical School,” and that he has “considerable expertise in asbestos diseases, including mesothelioma.” *Id.* The court accepted his opinion that special exposures include repeated occupational exposures to asbestos products. *See id.* at \*3. The court held that Dr. Mark’s causation opinion was sufficiently supported by the facts regarding the plaintiff’s exposure to asbestos dust from joint compound products, and that his opinion should not be excluded. *See id.* at \*5, \*6 n.6.

An appellate court in Louisiana has come to the same conclusion. *See Robertson v. Doug Ashy Bldg. Materials, Inc.*, 77 So. 3d 339, 354 (La. App. 1 Cir. 10/4/11) (**Ex. 13**). That court reversed the trial court’s exclusion of Dr. Mark’s causation testimony, finding that it was error to exclude Dr. Mark’s special exposure opinions, as the defendant had not shown that his opinions lacked a reliable foundation. *See id.* at 359. Dr. Mark’s causation testimony was also admitted as reliable under California’s substantial factor causation standard in *Izell v. Union Carbide Corporation*, 231 Cal. App. 4<sup>th</sup> 962, 976-77 (2014).

The federal district court for the District of Alabama also recently admitted Dr. Mark’s causation testimony. **Ex. 15**, *Bobo v. TVA*, No. 12-S-1930-NE, 2014 U.S. Dist. LEXIS 117917, at \*24-\*28 (N.D. Ala. Aug. 25, 2014). There, Judge Lynwood Smith rejected a challenge to Dr. Mark’s opinion,

determining not only that he does not hold the “every exposure” opinion as defendants claimed, but also that the court did “not find Dr. Mark’s opinions regarding the cumulative nature of asbestos diseases and the effect that each significant exposure of asbestos has on the development of such diseases to be inherently unreliable.” *Id.* at \*27. The court noted that Dr. Mark was relying on evidence of the plaintiff’s exposure history, as well as “ample citations to scientific literature and studies to support each of the underlying bases to his opinion.” *Id.* He further noted that Dr. Mark “relied on numerous epidemiological studies finding that even relatively low cumulative exposures to asbestos can cause mesothelioma.” *Id.*

Other courts that have admitted Dr. Mark’s causation opinions as reliable and admissible have specifically noted that his causation opinions were based on the particular facts of the plaintiff’s exposure history. *See, e.g., Ex. 14, Hill v. Air & Liquid Systems Corp.*, Tentative Order re Motion to Exclude Plaintiffs’ Experts (C.D. Cal. Oct. 30, 2014); **Ex. 16, Kinseth v. A.Y. McDonald Industries, Inc.**, Ruling on Motions to Exclude, at 11-13 (Iowa Dist. Ct. Feb. 26, 2014).

Dr. Brody’s testimony has been similarly accepted by many courts across the country, including the federal asbestos MDL in the Eastern District of Pennsylvania. *See Larson v. Bondex Int’l*, No. 09-69123, 2010 U.S. Dist. LEXIS 123090 (E.D. Penn. Nov. 15, 2010). In rejecting a challenge to the reliability of Dr. Brody’s general causation opinions, Judge Eduardo Robreno determined that Dr. Brody’s testimony about the manner in which asbestos causes disease was supported by “‘scientific investigations on humans and correlative animal and cell studies’ confirming the relationship between asbestos fibers and four asbestos-related diseases discussed,” including 146 peer-reviewed publications and fifty book chapters authored or co-authored by Dr. Brody. *Id.* at \*7 (citing Magistrate Judge Angell’s Memorandum Opinion). Judge Robreno therefore held that, “[g]iven the purpose of Dr. Brody’s testimony, to assist the jury in understanding the relationship between exposure to asbestos fibers and disease processes generally, and the breadth of peer-reviewed publications relied on,” his testimony is reliable under Federal Rule of Evidence 702 and *Daubert v. Merrell Dow Pharmaceuticals Inc.*, 509 U.S. 579 (1993); *see also Rabovsky v. Air & Liquid Sys. Corp.*, No. 10-cv-03202, 2012 WL 252919 (E.D. Penn.

Jan. 25, 2012), *affirmed by* 2012 WL 876752 (E.D. Penn. Mar. 13, 2012). Trial courts in South Carolina, Iowa, and Florida have issued recent opinions agreeing that Dr. Brody's general causation testimony is reliable and admissible. **Ex. 100**, *Garvin v. Agco Corp., et al.*, at 22 (S.C. Ct. Comm. Pl. Nov. 14, 2014); *Kinseth*, at 11-13; **Ex. 101**, *Muniz v. Advanced Stores Company*, at second page (Fl. Cir. Ct. Nov. 26, 2013).

The federal asbestos MDL has repeatedly ruled that the opinion that every exposure to asbestos above background levels contributes to cause mesothelioma satisfies the *Daubert* admissibility standard for expert testimony. *See Rabovsky v. Air & Liquid Sys. Corp.*, No. 10-cv-03202, 2012 U.S. Dist. LEXIS 9169 (E.D. Penn. Jan. 25, 2012), *affirmed by* 2012 U.S. Dist. LEXIS 34085 (E.D. Penn. Mar. 13, 2012); *Schumacher v. Amtico*, No. 5:10-1627, 2010 U.S. Dist. LEXIS 144831 (E.D. Pa. Nov. 2, 2010); *Larson v. Bondex Int'l*, No. 09-69123, 2010 U.S. Dist. LEXIS 123090 (E.D. Penn. Nov. 15, 2010); *Anderson v. Saberhagen Holdings, Inc.*, No. 10-cv-61118, 2011 U.S. Dist. 15870 (E.D. Penn. Feb. 16, 2011).

In *Schumacher*, the court found that Dr. John Maddox had used a reliable methodology in reaching this opinion. He relied on a variety of peer-reviewed studies, including the Consensus Report, and considered the amount of fibers released from working with the products at issue. *Id.* at \*5-\*6. The court noted that there is a significant body of published literature regarding what level of asbestos exposure can cause mesothelioma and that there is a legitimate debate within the scientific community regarding what that threshold level is (and indeed, whether a numeric threshold is even ascertainable). *Id.* at \*7. Although the plaintiff's expert took one position in that debate and the defendant's expert took the opposite position, that does not make the plaintiff's expert's opinion unreliable or inadmissible. *Id.* at \*7-\*8. Rather, the defendant's criticisms of the opinions were simply "fodder for cross-examination, and do not preclude the admissibility of [the] opinion." *Id.* at \*7; *see also Rabovsky*, 2012 U.S. Dist. LEXIS 34085, at \*12-\*14; *Rabovsky*, 2012 U.S. Dist. LEXIS 9169, at \*15-\*18.

In 1973, the Fifth Circuit Court of Appeals observed that it has been "established that the effect of exposure to asbestos dust is cumulative, that is, each exposure may result in an additional and separate injury." *Borel*, 493 F.2d at 1094. Many cases from many other jurisdictions are in accord, and have

admitted expert testimony to this effect. *See Quirin v. Lorillard Tobacco Co.*, 2014 U.S. Dist. LEXIS 26218, at \*9-\*10 (N.D. Ill. Feb. 28, 2014); *Caruolo v. A C & S, Inc.*, 1999 U.S. Dist. LEXIS 3022, at \*25-\*28 (S.D.N.Y. Mar. 11, 1999); *Blancha v. Keene Corp.*, 1991 U.S. Dist. LEXIS 15394, \*15-\*16 (E.D. Pa. Oct. 23, 1991); *John Crane, Inc. v. Linkus*, 988 A.2d 511, 523-24 (Md. App. 2010); *Jones v. John Crane, Inc.*, 35 Cal. Rptr. 3d 144, 151 (Cal. App. 2005); *AC & S, Inc. v. Abate*, 710 A.2d 944, 988 (Md. App. 1998), *abrogated on other grounds by John Crane, Inc. v. Scribner*, 800 A.2d 727 (2002); *John Crane, Inc. v. Wommack*, 489 S.E.2d 527, 541 (Ga. Ct. App. 1997); *Mavroudis v. Pittsburgh-Corning Corp.*, 935 P.2d 684, 689 (Wash. 1997); *Kurak v. A.P. Green Refractories Co.*, 689 A.2d 757, 761 (N.J. Super. Ct. App. Div. 1997); *Held v. Avondale Industries, Inc.*, 672 So.2d 1106, 1109 (La. App. 1996).<sup>10</sup>

Numerous courts have also admitted the scientific opinion, as expressed by Dr. Mark in this case, that exposure to asbestos brakes contributes to cause mesothelioma. *See General Motors Corp. v. Grenier*, 981 A.2d 531, 535 (Del. 2009) (upholding the admission of expert causation testimony that an auto mechanic's mesothelioma was caused by his exposure to asbestos from brakes); *Chapin v. A & L Parts, Inc.*, 732 N.W.2d 578 (Mich. App. Ct. 2007) (affirming a trial court's decision upholding the reliability of an expert's opinion that exposure to asbestos brake dust can cause mesothelioma); *Klima v. Volkswagen of America, Inc., et al.*, No. A095614, 2003 WL 22172417, at \*9 (Cal. App. Sept. 22, 2003) (admitting expert testimony that "bystander" exposure to nine brake jobs was sufficient to establish causation given the strong causal link between asbestos and mesothelioma in the scientific literature).

## **V. DEFENDANTS' ADDITIONAL CRITIQUES OF DR. MARK'S METHODOLOGY ARE UNFOUNDED.**

Despite the fact that Dr. Mark's opinions are consistent with the consensus view on the causation of asbestos-related disease, and the type of causation opinions he has expressed have repeatedly been

---

<sup>10</sup> Moreover, many courts have concluded that mesothelioma is a unique disease that can be caused by even short or minimal exposures to asbestos. *See Tragarz v. Keene Corp.*, 980 F.2d 411, 420 (7th Cir. 1992); *McAskill v. Am. Marine Holding Co.*, 9 So. 3d 264, 268 (La. Ct. App. 2009); *Georgia-Pacific Corp. v. Pransky*, 800 A.2d 722, 725 (Md. 2002); *Harashe v. Flintkote Co.*, 848 S.W.2d 506, 508 (Mo. Ct. App. 1993); *Sheffield v. Owens-Corning Fiberglass Corp.*, 595 So. 2d 443, 456 (Ala. 1992).

recognized as reliable and admissible expert testimony, Ford and Honeywell raise a series of critiques of Dr. Mark's methodology, none of which have the slightest merit.

**A. Dr. Mark does not “substitute disease for methodology.”**

Defendants attempt to distort Dr. Mark's opinion by contending that “he asserts the fiction, disguised in terms of ‘special exposures,’ that if there were exposures to asbestos (regardless of how low the dose) and a disease was diagnosed, then *ispo facto* the cause of the disease was the exposures to asbestos.” (Doc. 381 at 20). They further accuse him of “rest[ing] on the circular, unscientific reasoning that the presence of the disease is sufficient to prove its cause.” (Doc. 383 at 17). Dr. Mark in fact testified that he would not simply attribute mesothelioma to asbestos exposure simply based on the fact of diagnosis. Mark Depo., 3/16/15, at 25:13-17. He further explained that he does not believe that the mere presence of asbestos fibers in the lungs would be sufficient to indicate an increased risk of developing mesothelioma. *Id.* at 79:15-21. He does not believe that trivial exposures are causative, and explained that a trivial exposure would be one where there was no scientific evidence to conclude that there is an increased risk of disease. *Id.* at 49:14-25.

When asked whether his reference to cumulative asbestos exposure refers to “each and every exposure” that an individual experiences, Dr. Mark answered, “No.” (Doc. 381-1 at 17:20-23; *see also* Doc. 381-3 at 294:17-21). When asked again about whether he believes “every exposure” to asbestos that Yates had contributed to cause his disease, Dr. Mark explained that, “[e]very special exposure encountered—with encountering occupational or para-occupational exposures did increase his risk of developing disease, but I’m not able to talk about individual fibers.” (Doc. 381-3 at 331:4-12). As he recently testified in another case, “I do not think that one individual fiber can cause disease.” **Ex. 11**, Deposition of Dr. Eugene Mark, *Cowan v. Agco Corp., et al.*, 8/7/13, at 67:16-22. He further elaborated that it would not be a special exposure to be exposed to an asbestos product on only one occasion because “there is no scientific reason or evidence to show you that that type of single exposure causes increased risk of disease.” *Id.* at 68:12-69:9.

Indeed, Courts that have accepted Dr. Mark's causation testimony in asbestos cases have rejected Defendants' mischaracterization of his opinion. For example, in *Mahoney*, the court clarified that Dr. Mark had not testified that "any exposure" to asbestos causes mesothelioma, but rather his opinion is that each "special exposure" to asbestos was a contributing factor to the Plaintiff's disease. 2009 WL 3451754, at \*3, \*6 n.6. The court accepted his explanation that special exposures include repeated occupational exposures to asbestos products. *See id.* at \*3. The court in *Robertson* agreed. There, the Louisiana Court of Appeal started by observing that, "[f]irst and foremost, we agree with the plaintiffs that both Sherwin-Williams and the trial court have mischaracterized the substance of Dr. Mark's testimony. We have reviewed the affidavit and the expert report attached thereto of Dr. Mark that are contained in the record and do not see that Dr. Mark opined that every single asbestos fiber inhaled contributes to an individual's mesothelioma or that the inhalation of a single asbestos fiber was sufficient to cause mesothelioma." *Id.* The *Izell* court similarly noted that, "[c]ontrary to Union Carbide's characterization, Dr. Mark did not opine that every exposure constituted a substantial factor. Rather, he testified that only those exposures in which the asbestos-containing products was 'dry enough so that asbestos fibers could be released into the air,' and the asbestos became 'airborne' and Mr. Izell 'breathed it in' would be significant enough to contribute to his risk of contracting cancer." 231 Cal. App. at 977.

Plaintiffs also note that Dr. Mark's observation that mesothelioma is a signal disease for asbestos exposure is a well-accepted scientific fact. Dr. Roggli in fact agrees with this basic scientific principle, testifying that, "[s]cience has not demonstrated any cause of mesothelioma in the workplace other than exposure to all forms of asbestos dust, which makes it a signal malignancy, i.e., an epidemiological marker for exposure to asbestos." Roggli Aff., 5/29/01, at 2. This view is supported by the Consensus Report, which found that, "[t]he great majority of mesotheliomas are due to asbestos exposure." Consensus Report 2014, at 6 (quoting Consensus Report); *see also* **Ex. 102**, Checkoway, et al., RESEARCH METHODS IN OCCUPATIONAL EPIDEMIOLOGY 248 (2d ed. 2004) (observing that malignant mesothelioma is a rare form of cancer that is "nearly always attributable to asbestos exposure"); **Ex. 103**, Federal Reference Manual on Scientific Evidence 635, 672 (Third Ed.) ("[T]he relatively rare lung



cancer known as mesothelioma is almost always caused by asbestos . . . . It is easier to establish causation when a symptom is unusual and rarely is caused by anything other than the suspect chemical (e.g., such rare cancers as . . . mesothelioma, associated with asbestos exposure).”) Dr. Mark’s recognition of this consensus view does not mean that he is “substituting” this view for a causation methodology—his detailed analysis and evaluation of Yates’s exposure in comparison with the scientific literature belies this contention.

**B. Dr. Mark considered the amount of Yates’s exposure to asbestos from Defendants’ products.**

It is absolutely untrue that “Dr. Mark lacks sufficient information as to the duration and doses of Mr. Yates’ alleged exposures to Defendants’ products.” (Doc. 383 at 28-29). Dr. Mark’s opinions are firmly grounded in the exposure evidence in this case. He reviewed and relied on Yates’s testimony about exposure to visible dust when changing brakes on his own cars, working at an Esso gas station in the 1950s, and working as a parts handler at a Ford dealership in the 1960s. Mark Report and Declaration, August 2013, at 4-5. In his deposition, he described that Yates was exposed to asbestos brakes over a period of years. Mark Depo., 3/16/15, at 81:23-82:19.

Dr. Mark noted a number of studies showing that the activities described by Yates—including cleaning brake drums, sanding new brake pads, handling brake boxes, and sweeping up after brake changes—resulted in substantial exposures to asbestos. Mark Report and Declaration, August 2013, at 5-7. He concluded that, “[b]ased on my review of this literature, and the work practices described by Mr. Graham Yates, it is my opinion that the work with asbestos brakes performed by Mr. Graham Yates and others in his presence caused him to be exposed to asbestos substantially above background levels, as defined by both Nicholson and the Environmental Protection Agency.” *Id.* at 7. He explained that, “[t]he presence of visible dust released from asbestos-containing products, including asbestos brake friction products, is of the type that has been scientifically shown to increase the risk of diffuse malignant mesothelioma.” *Id.* at 1. Dr. Mark lists numerous scientific articles that support his opinion that Yates’s brake exposures were a substantial contributing factor in the development of his mesothelioma. *Id.* at 7-9.

Dr. Mark is also relying on the report of Certified Industrial Hygienist Steve Hays, **Ex. 39**. Hays explains that when an asbestos product releases visible dust, that “represents an asbestos exposure that is at least hundreds of times above background/ambient exposure levels.” Hays Report, at 8. He also states that “[a]sbestos fibers are very small and possess aerodynamic qualities such that the fibers, once released to the air, may remain suspended for hours, and hence remain in the breathing zone of workers and bystanders.” *Id.* at 9. Because asbestos fibers settle on work surfaces and then are re-suspended in the air when disturbed, this repeated process can lead to very high exposures. *Id.* In short, “[a]irborne asbestos does not settle quickly from the air and can easily become re-entrained after it does settle.” *Id.* at 51.

With regard to exposure from asbestos friction products, Hays explained that “[t]he literature is replete with asbestos exposure above background levels in the brake repair and maintenance industry.” Hays Report, at 50. Those studies are reviewed on pages 46-50 of his report, and they show high exposures from blowing out brake drums, sanding brake shoes (including brake shoes specifically made by Ford), and sweeping the asbestos dust following such activities. *Id.* Hays also discusses that there are significant exposures even to bystanders. *Id.* at 10-13, 51. He wrote a supplemental report specifically on the exposures known to occur from opening boxes of asbestos-containing friction products, as Yates did, and explained that the literature leads to the conclusions that, “(i) the asbestos fibers in brakes are releasable, and these airborne fibers are respirable, (ii) the opening of boxes of brakes does produce an asbestos exposure that increases ones risk to an asbestos related disease . . . .” **Exhibit 108**, at second page.

In addition, Dr. Mark explained that evidence regarding the amount of exposure is not generally expressed in terms of a mathematical dose:

- Q. Let me ask you, sir, intensity of exposure can be expressed in terms of fibers per cc, correct?
- A. Usually it's not, because you see that figure is not available. **Usually it's expressed in terms of visible dust and the types of asbestos and work practices**, but you can express it mathematically if you've got the facts as a mathematical number.

Mark Depo., 3/16/15, at 63:17-24 (emphasis added). He added that he *can* quantify Yates's exposure

because there was testimony that he saw visible dust. (Doc. 381-3 at 317:22-318:14). When there is visible dust, there is exposure to at least 5 million particles per cubic feet of air. *Id.*; Mark Report and Declaration, August 2013, at 6.

Dr. Mark's report also discusses the substantial body of literature finding that mesothelioma is caused by brief and low level exposures to asbestos. Mark Report and Declaration, August 2013, at 17-23; *see also* Section IV.A. *supra*. Contrary to Defendants' accusation that this is a "downward extrapolation" of assuming low exposures cause disease because high exposures cause disease, Dr. Mark compared Yates's exposure history to the scientific literature documenting that relatively low cumulative asbestos exposures cause mesothelioma, and determined that Yates "was exposed to a range of exposures that have been shown in the literature cited herein to cause diffuse malignant mesothelioma." Mark Report and Declaration, August 2013, at 28. That literature includes the Iwatsubo and Rodelsperger epidemiological studies. *Id.* at 22-23, 28; Section IV.A., *supra*.

Dr. Mark summed up that his opinions were based on the exposure evidence and Yates's medical records, and "the medical and scientific literature concerning asbestos exposure and disease, available studies concerning fiber release, epidemiologic studies which correlate levels of exposure with disease, and my knowledge, skill, experience, and training as a physician." Mark Report and Declaration, August 2013, at 29. Contrary to Defendants' contention that Dr. Mark is relying simply on a flimsy special exposure opinion, Dr. Mark has a substantial factual and scientific foundation for his opinions that indicate his testimony is the product of a reliable method.

**C. Precise quantification of exposure is not required.**

In a similar vein, Defendants incorrectly contend that a necessary prerequisite to any causation determination is a quantitative evaluation of the "dose" of asbestos that Yates inhaled from their products. This is neither a legal nor a scientific requirement.

First, the Consensus Report does not require a quantitative estimate of a patient's asbestos "dose" exceeding some undefined level in order to attribute mesothelioma to a given asbestos exposure. Rather, in order for a doctor to conclude that a mesothelioma is asbestos related, there needs to be evidence (such

as a patient interview or lay testimony) that the mesothelioma patient breathed asbestos fibers in an occupational, paraoccupational, domestic, or similar setting. Consensus Report, at 313; Consensus Report 2014, at 6.

Quantification of exposure is not required under North Carolina law. Rather, the standard is that a plaintiff in an asbestos action must demonstrate that he was “actually exposed” to the defendant’s asbestos-containing product. *Wilder v. Amatex Corp.*, 314 N.C. 550, 553-54, 336 S.E.2d 66, 68 (1985). Actual exposure is shown through the frequency, regularity, and proximity factors. *See Jones v. Owens-Corning Fiberglas Corp.*, 69 F.3d 712, 716 (4th Cir. 1995).

Defendants are attempting to equate North Carolina law with a Texas case on this issue, *Borg-Warner Corp. v Flores*, 232 S.W.3d 765 (Tex. 2007), that requires evidence of a defendant-specific dose of asbestos. Not only has North Carolina adopted the *Borg-Warner* standard, Defendants cannot offer a citation to any other court in the country that has adopted it. In truth, there is no indication that the *Borg-Warner* decision represents anything other than an outlier. Prior to the decision in *Borg-Warner*, courts have uniformly adopted the following standard in mesothelioma cases:

Thus, it is not essential to establish with any precision the quantity, duration, or percentage of the occupational exposure to asbestos for which any or each particular manufacturer or supplier is responsible in order to establish proximate cause and, therefore, liability. Every such exposure is a substantial factor in bringing about mesothelioma, and may be so found when the latency period is consistent.

*Blancha*, 1991 WL 224573 at \*6; *see also Spaur v. Owens-Corning Fiber Glass Corp.*, 510 N.W.2d 854, 861 (Iowa 1994).

Since the decision in *Borg-Warner*, no other court had adopted its quantification requirement. Instead, any kind of dose or quantification requirement has been universally recognized as an outlier that imposes an unreasonably difficult causation standard on asbestos plaintiffs. *See, e.g., Julie Offerman, “The Dose Makes the Poison”: Specific Causation in Texas Asbestos Cases After Borg-Warner*, 41 Tex. Tech L. Rev. 709, 721 (2009) (noting that “the Texas Supreme Court adopted one of the most stringent causation standards in the nation by requiring plaintiffs to quantify their exposure” and

that “[t]he tests that other state and federal courts apply to determine whether a plaintiff has established proximate causation in an asbestos case differ drastically from the standard adopted [in *Flores*]”).

The Fourth Circuit has held precise quantification of dose is unnecessary. *See Westberry v. Gislaved Gummi AB*, 178 F.3d 257 (4<sup>th</sup> Cir. 1999). In *Westberry*, the Fourth Circuit allowed the plaintiff’s expert to testify that exposure to talc caused his sinus disease, even without evidence of a precise dose. The court explained that, “while precise information concerning the exposure necessary to cause specific harm to humans and exact details pertaining to the plaintiff’s exposure are beneficial, such evidence is not always available, or necessary, to demonstrate that a substance is toxic to humans given substantial exposure and need not invariably provide the basis for an expert’s opinion on causation.” *Id.* at 264. *Westberry* relied on the Third Circuit’s opinion in *Heller v. Shaw Indus., Inc.*, 167 F.3d 146, 157 (3d Cir. 1999), which held “that even absent hard evidence of the level of exposure to the chemical in question, a medical expert could offer an opinion that the chemical caused plaintiff’s illness.”

*Westberry* admitted the expert’s opinion because it was based on evidence that the plaintiff was exposed to visible dust that contained talc, and “there was no dispute that exposure to high concentrations of airborne talc could cause irritation to mucous membranes.” *Westberry*, 178 F.3d at 264. Similarly, here Dr. Mark bases his opinion on evidence of the amount of Yates’s exposure, relying on his history of years of repeated exposures to asbestos brakes through opening brake boxes, being present during installation, and sweeping up brake dust. In addition, he is relying on literature documenting that low cumulative levels of exposure increase the risk of mesothelioma. Dr. Mark’s opinions thus have a firm foundation in the factual and scientific evidence.

**D. Dr. Mark’s expert opinion testimony is a reliable part of Plaintiffs’ evidence of substantial factor causation.**

Defendants also contend that the “each and every exposure” theory does not satisfy the substantial factor causation test. (Doc. 383 at 11). Besides the fact that Dr. Mark has not offered this opinion, this is another argument that suffers from flawed and simplistic reasoning. The asbestos MDL rejected this argument in the *Rabovsky* case, finding that the admissibility of the expert’s opinion is not

really related to the sufficiency of the evidence question. 2012 U.S. Dist. LEXIS 34085, at \*12-\*13. This is because an asbestos plaintiff can rely on multiple types of evidence to meet her burden of proving causation, with her expert's opinion being only one part of her case. As noted above, this Court's gatekeeping function does not involve examining the correctness of the expert's conclusions, but instead focuses on the reliability of the expert's methodology. In fact, expert evidence "does not warrant exclusion simply because it fails to establish the causal link to a specified degree of probability." *Ambrosini v. LaBarraque*, 101 F.3d 129, 135 (D.C. Cir. 1996). Rather, "[t]he dispositive question is whether the testimony will assist the trier of fact to understand the evidence or to determine a fact in issue, not whether the testimony satisfies the plaintiff's burden on the ultimate issue at trial." *Id.*

This distinction was made in the recent case of *Sweredoski v. Alfa Laval, Inc.*, 2013 R.I. Super. LEXIS 111 (R.I. Super. Ct. June 13, 2013). In a thorough analysis, the court considered the exact argument Defendants makes here, and determined that it did not warrant exclusion of the expert's opinion. *Id.* at \*24-\*27. The court noted that the "every exposure" opinion alone would not be sufficient to satisfy the plaintiff's causation burden, and that the plaintiff would naturally have to introduce evidence of sufficient exposure to the defendant's product: "While a plaintiff may present 'each and every exposure' evidence at trial to establish the inherent dangers of breathing in asbestos, such evidence will not satisfy the causation standard adopted here unless it is accompanied by sufficient evidence of the 'frequency, regularity, and proximity' of the plaintiff's exposure to asbestos to establish that such exposure was a substantial factor in bringing about the plaintiffs injury." *Id.* at \*27-\*28.

Defendants pretend that Plaintiff will try to meet their causation burden by simply relying on an expert opinion that "each and every exposure" to asbestos causes mesothelioma. This is not the case, as Dr. Mark in fact requires the exposures to meet certain well-defined criteria before they can be considered causative, and based on the exposure evidence in this case it is abundantly clear the Yates did have significant and repeated exposures to dust from Defendants' brake friction products. This evidence of exposure will be part of Plaintiffs' case in chief at trial. The critiques offered by Ford and Honeywell do not warrant exclusion of Dr. Mark's causation opinions.

**E. Dr. Mark's opinion accounts for fiber type and the relative potency of chrysotile.**

Defendants accuse Dr. Mark of ignoring fiber type, and further contend that, “Dr. Mark’s opinion that all exposures—to any type of asbestos at any dose above background—contribute to disease at the same level cannot stand in the face of his admissions that it would take a higher dose of chrysotile than amphibole asbestos to cause mesothelioma.” (Doc. 383 at 19; Doc. 381 at 11). Once again, Dr. Mark does not believe that exposures “to any type of asbestos at any dose above background” are causative. Further, Dr. Mark has not ignored fiber type. His report includes an entire section addressing the ability of chrysotile asbestos to cause disease. Mark Report and Declaration, August 2013, at 12-17. Moreover, while Dr. Mark does acknowledge differences in the relative potency between amphibole asbestos and chrysotile asbestos, the scientific evidence has never demonstrated a threshold below which exposure to chrysotile asbestos does not occur. *See* Section IV.B., *supra*. Numerous studies show that low doses of exposure to chrysotile asbestos cause disease. *See* Section IV.B., *supra*; Doc. 296-4 at 78:5-79:16.

Defendant’s insistence on identifying a threshold dose for chrysotile runs counter to basic scientific principles about asbestos disease causation. The attempt to identify a threshold for chrysotile exposure was disapproved and called “logical nonsense” by the very peer-reviewed scientific literature that is commonly relied upon by defense experts regarding the relative differences in potency between asbestos fiber types. **Ex. 104**, J. Hodgson & A. Darnton, *The Quantitative Risks of Mesothelioma and Lung Cancer in Relation to Asbestos Exposure*, Ann. Occup. Hyg. 44(8):565-601, 583 (2000). Indeed, Dr. Garabrant relies on this article in this case. (Doc. 296-3 at 5).

The Hodgson and Darnton paper explains that postulating a threshold dose for mesothelioma risk is not a reliable or acceptable scientific method because it is “fraught with statistical and logical difficulties.” Hodgson & Darnton, *supra*, at 583. Further, “[t]he attempt [] to deduce a ‘threshold’ by identifying the lowest estimated dose received by any observed case is a logical nonsense.” *Id.* Considering all available scientific evidence, the authors concluded that, “we do not believe there is a good case for assuming any threshold for mesothelioma risk.” *Id.* Dr. Mark’s opinions are consistent

with this mainstream view.

Finally, it must be noted that Defendants' brake friction products contained both chrysotile asbestos and tremolite asbestos, which is an amphibole fiber. Tremolite is known to co-exist with chrysotile mined from Canada, Mark Depo., 3/16/15, at 35:23-36:8, which is the source of the chrysotile used in Defendants' asbestos brake friction products. It is thus Defendants that ignore fiber type in making their arguments against Dr. Mark.

**F. The lack of a known threshold for the induction of mesothelioma does not render Dr. Mark's opinions unreliable or without adequate foundation.**

Defendants contend that Dr. Mark's opinion does not meet *Daubert* because it is "untestable." First, this argument ignores that notion that testability is not dispositive. Defendants cite the trial court's opinion in *Butler v. Union Carbide Corp.*, which faulted the plaintiff's expert's testimony because the court thought that there had not been adequate testing to establish a threshold exposure level for mesothelioma. *Butler* and other cases cited by Defendants misinterpret the experts' reliance on the scientific literature showing that there is no known safe level of exposure to asbestos. Oddly, this is taken as an absence of data to support the experts' opinions. *See Anderson*, 2013 U.S. Dist. LEXIS 88457, at \*19-\*20; *Smith v. Ford Motor Co.*, No. 2:08-cv-630, 2013 U.S. Dist. LEXIS 7861, at \*7 (D. Utah Jan. 18, 2013). For example, in *Anderson* the court asserts that, "their testimony is based on their lack of information sufficient to show the level of exposure which does not create a risk of mesothelioma." 2013 U.S. Dist. LEXIS, at \*19.

Dr. Mark has never opined, as Defendants suggest, that the lack of a known threshold in and of itself is proof of causation. But it is certainly part of the evidence that very low levels of asbestos exposure cause mesothelioma, which supports Dr. Mark's opinions in this case. The fallacy with Defendants' reasoning is identified in a recent decision by the Seventh Circuit, *Schultz v. Akzo Nobel Paints, LLC*, No. 12-1902, 2013 U.S. App. LEXIS 13059 (7<sup>th</sup> Cir. June 26, 2013). In this benzene exposure case, the defendant attacked the plaintiff's expert's opinion because he stated that there was no known threshold below which benzene exposure does not cause acute myeloid leukemia ("AML"), but



had had also identified the exposure level at which studies had found an elevated risk of AML. *Id.* at \*8-\*9, \*14. The court explained that there is no inconsistency in these two positions: “The first says, in essence, that scientific studies confirm the danger of exposure to more than 10 ppm-years of benzene. The second says that no one is sure whether 10 ppm-years is the floor for risk, or 5 ppm-years, or 1 ppm-year, or nothing.” *Id.* at \*14. The Seventh Circuit disagreed with the trial court’s conclusion that the expert had found the amount of exposure to be “irrelevant,” given that the expert’s “unambiguous conclusion that [the plaintiff] had been exposed to a level of benzene that has been shown in studies to be a ‘very toxic and dangerous level.’” *Id.* at \*15. The record in this case is equivalent to that found sufficient to support the expert’s opinion in *Schultz* because, as noted above, Dr. Mark has relied on Yates’s history of exposure and epidemiological studies finding that low cumulative occupational asbestos exposures increase the risk of mesothelioma several-fold.

**G. The case law cited by Ford and Honeywell is inapposite.**

Defendants contend that Dr. Mark’s opinion testimony should be excluded because “numerous courts have rejected any-exposure testimony in mesothelioma cases.” (Doc. 381 at 25). Once again, Dr. Mark has not offered the opinion that “any exposure” to asbestos causes mesothelioma. Defendants primarily cite cases in which experts testified about specific causation without any reference to the individual exposure history of the plaintiff. *See Betz v. is Pneumo Abex, LLC*, 44 A.3d 27, 55 (Pa. 2012); *Anderson v. Ford Motor Co.*, No. 2:06-cv-741 TS, 2013 U.S. Dist. LEXIS 88457, \*8, \*11, \*15, \*19 (D. Utah June 24, 2013). That is obviously not the case here, where Dr. Mark has based his opinions on Yates’s history of years of brake exposure, as well as the industrial hygiene literature regarding the levels of exposure from working with asbestos brake friction products. Mark Report and Declaration, August 2013, at 4-7. Similarly, the Texas cases relied on by Defendants are inapplicable because they are addressing an “any exposure” theory that is not at issue here.

Defendants are very misleading in their reliance on Judge Tereshcko’s opinion out of the Court of Common Pleas of Pennsylvania. This decision to exclude Dr. Mark’s testimony was overturned on appeal. Mark Decl., at 1. Defendant should have acknowledged that Judge Tereshko’s ruling is not good

law. The Pennsylvania Superior Court has in fact accepted Dr. Mark's causation testimony as reliable and admissible in other cases. For example, in *Moore v. Ericsson, Inc.*, 7 A.3d 820, 825-27 (Pa. Super. Ct. 2010). The court began by noting that Dr. Mark "is an expert in mesothelioma and asbestos." *Id.* at 825. Dr. Mark testified that there is no safe level of exposure to asbestos, and based his causation opinion on a hypothetical based on evidence in the record showing that the plaintiff had regularly breathed dust from cutting asbestos wire. *See id.*

Defendants' citation of the Washington case *Free v. Ametek* is also highly misleading and is not representative of that state's approach to this issue. In 2006, the King County asbestos judge (with a docket of hundreds of asbestos cases in Seattle) held a lengthy *Frye* hearing, denied the motion to exclude the plaintiff's expert's opinion regarding causation of mesothelioma from low levels of asbestos exposure, and noted that other courts have accepted testimony "to the effect that every exposure contributes, that it is a dose response disease and that the cumulative effect is what ultimately causes [ ] illness." *Id.* at 81-82. **Ex. 105**, *Lott v. Bondex Int'l* hearing transcript, Nov. 6, 2006; *see also* *Lipson v. ON Marine Servs. Co., LLC*, 2013 U.S. Dist. LEXIS 175317, at \*10 (W.D. Wash. Dec. 13, 2013) (admitting the cumulative exposure causation opinion of Dr. Carl Brodtkin as based on a "sound methodology" and rejecting the argument that his opinion was "equivalent to 'every fiber in disguise'").

**H. Dr. Mark has properly considered Yates's exposure to asbestos in the U.S. Navy.**

Defendants falsely contend that, "Dr. Mark did not weigh the possibility of other causes, specifically amosite asbestos from thermal insulation in the Navy." (Doc. 381 at 24). Dr. Mark *did* consider Yates's time in the Navy, and to the extent Yates breathed dust from the disturbance of asbestos insulation Dr. Mark believes that would be a substantial contributing factor in causing his disease. Mark Depo., 3/16/15, at 27:15-29:16. However, there is very little evidence that Yates did in fact breathe dust from thermal insulation in the Navy:

- Q. Would you express Mr. Yates' intensity of exposure to asbestos while exposed to thermal insulation in the Navy in a quantitative manner?
- A. Low. Low, because he never describes dust, and he never describes being there when the dust is created.

*Id.* at 64:22-65:3. Plaintiffs have a pending motion to exclude Defendants' experts' opinions that exposure to asbestos thermal insulation in the Navy was causative of Yates's mesothelioma, as there is insufficient evidence that Yates was actually exposed to asbestos dust during his Navy service. (Doc. 301).

**I. Dr. Mark's opinions about forsterite and exposure from brake boxes are reliable.**

Finally, Defendants make a further attempt to cast doubt on Dr. Mark's opinion about the ability of exposure to brake dust to cause mesothelioma. First, they contend that Dr. Mark agrees that 99% of the chrysotile asbestos in brake linings is converted to forsterite, a non-carcinogenic compound. This is not entirely accurate. His testimony was that the percentage of chrysotile that converts to amount of forsterite is "a direct relationship to time and heat. The longer the brake is used the greater the conversion quantity, and the higher the heat achieved the greater the conversion." Mark Depo., 3/16/15, at 39:17-40:19. □ Even after a brake has been used, there are still chrysotile asbestos fibers released into the air when dust is created. *Id.* at 44:2-5. Millions of fibers are released into the air even from brakes that have been used. Mark Report and Declaration, August 2013, at 6-7. Moreover, most of Yates's exposures to asbestos from Defendants' brake friction products occurred before the brakes were used—either from opening and handling new brakes or being around the brakes when they being sanded during installation. Mark Depo., 3/16/15, at 87:1-5, 88:1-10. As Dr. Mark explained, there is no forsterite created before heat and pressure is applied to the brakes. Mark Depo., 3/16/15, at 39:17-40:19. □

Defendants also contend that Dr. Mark has been inconsistent in his testimony about whether opening brake boxes would be a trivial exposure or a special exposure. This is disingenuous, as Dr. Mark has very clearly explained the distinction. He has stated that there is a big difference between simply opening a brake box, which would result in trivial exposure, and opening a box and being exposed to visible dust from inside the box and the brake itself. Mark Depo., 3/16/15, at 93:7-24; Mark Decl., at 1. He has clarified that, "while merely opening a box of brakes is a trivial exposure, it is not a trivial exposure when someone opens a box of brake shoes with visible dust in it, sees the dust inside the box,

personally handles those brake shoes, and testifies to breathing the dust in the air created from that process, as Mr. Yates testified to doing.” Mark Decl., at 1. There are numerous studies documenting that significant asbestos exposures result from opening brake boxes that contain visible dust, and the evidence is that Yates was exposed to visible dust in his breathing zone from opening brake boxes. Mark Report and Declaration, August 2013, at 5-6. Dr. Mark has therefore been entirely consistent in his opinion that Yates’s exposure to asbestos from opening dusty boxes containing Defendants’ brakes was a special exposure and a substantial contributing factor in causing his mesothelioma.

### CONCLUSION

For the reasons stated herein, Defendants’ motions to exclude the causation testimony of Dr. Mark and Dr. Brody are without merit. The motions are based on industry-funded literature that questions established scientific facts that are otherwise acknowledged to be sound by Honeywell, Ford, and their own expert Dr. Roggli, outside the context of litigation. The motions are part of a coordinated “Joint Defense Agreement” that has bought and paid for industry-friendly brake articles for use in motions like the ones brought by Ford and Honeywell against Dr. Mark and Dr. Brody. Accordingly, Defendants’ motions should be denied and Plaintiffs’ expert causation testimony should be admitted as reliable under *Daubert* and Rule 702.

Respectfully Submitted,

/s/ Kevin W. Paul  
Kevin W. Paul  
**SIMON GREENSTONE PANATIER  
BARTLETT**  
3232 McKinney, Suite 610  
Dallas, Texas 75204  
(214) 276-7680/(214) 276-7699 Fax  
[kpaul@sgpblaw.com](mailto:kpaul@sgpblaw.com)

/s/ Janet Ward Black  
Janet Ward Black  
NC State Bar 12869  
Attorney for Plaintiff  
Ward Black Law  
208 W. Wendover Ave.  
Greensboro, NC 27401

336-333-2244  
[jwblack@wardblacklaw.com](mailto:jwblack@wardblacklaw.com)

**ATTORNEYS FOR PLAINTIFF**

**CERTIFICATE OF SERVICE**

The undersigned hereby certifies that on May 18, 2015, I electronically filed *Plaintiffs' Consolidated Memorandum in Opposition to Defendants' Motions to Exclude Dr. Eugene Mark and Dr. Arnold Brody*, with the Clerk of Court using the CM/ECF system, which will send notification of such filing to all counsel of record.

/s/ Kevin W. Paul  
Kevin W. Paul